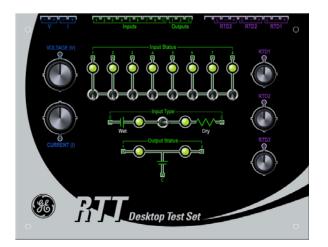


RELAY TEST TOOL

Instruction Manual



Manual P/N:1601-9021-A3 Manual Order Code: GEK-113388B Copyright © 2012 GE Digital Energy

GE Digital Energy 650 Markland Street Markham, Ontario Canada L6C 0M1 Tel: +1 905 927 7070 Fax: +1 905 927 5098 Internet: http://www.gedigitalenergy.com





GE Digital Energy's Quality Management System is registered to ISO9001:2000 QMI # 005094 These instructions do not purport to cover all details or variations in equipment nor provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, the matter should be referred to the General Electric Company.

To the extent required the products described herein meet applicable ANSI, IEEE, and NEMA standards; but no such assurance is given with respect to local codes and ordinances because they vary greatly.

© 2012 GE Digital Energy Incorporated. All rights reserved.

GE Digital Energy Relay Test Tool instruction manual version A3.

Relay Test Tool and RTT, are registered trademarks of GE Digital Energy Inc.

The contents of this manual are the property of GE Digital Energy Inc. This documentation is furnished on license and may not be reproduced in whole or in part without the permission of GE Digital Energy. The content of this manual is for informational use only and is subject to change without notice.

Part numbers contained in this manual are subject to change without notice, and should therefore be verified by GE Digital Energy before ordering.

Part number: 1601-9021-A3 (September 2012)

Table of Contents

1: GETTING STARTED	ORDERING	1
	Ordering the RTT	
	ABOUT YOUR NEW RTT UNIT	
	CAUTIONS AND WARNINGS	
	CHECK THE CONTENTS OF THE BOX	
	Using this Manual	
	About the RTT	
	RTT UNIT SPECIFICATIONS	
2: USING THE RTT ON	THE 469 MOTOR MANAGEMENT RELAY	. 11
SR SERIES RELAYS	Overview	. 11
	SR469 Motor Management Relay Terminal Layout	.12
	SR469 Motor Management Terminal Functions	. 13
	RTT TO SR469 WIRING DIAGRAM	
	INTERFACING TO THE RTT THROUGH THE ENERVISTA 469 SETUP PROGRAM	
	THE SR750/760 FEEDER MANAGEMENT RELAY	
	Overview	
	SR750/760 Feeder Management Relay Terminal Layout	
	SR750/760 FEEDER MANAGEMENT RELAY TERMINAL EXPOSITIONS	
	RTT to SR750/760 Wiring Diagram	
	INTERFACING TO THE RTT THROUGH THE ENERVISTA 750/760 SETUP PROGRAM	
	THE SR489 GENERATOR MANAGEMENT RELAY	
	Overview	
	SR489 GENERATOR MANAGEMENT RELAY TERMINAL LAYOUT	
	SR489 GENERATOR MANAGEMENT RELAY TERMINAL LAYOUT	
	RTT TO SR489 WIRING DIAGRAM	
	INTERFACING TO THE RTT THROUGH THE ENERVISTA 489 SETUP PROGRAM	
	THE SR745 TRANSFORMER MANAGEMENT RELAY	
	OVERVIEW	
	SR745 Transformer Management Relay Terminal Layout	
	SR745 TRANSFORMER MANAGEMENT RELAY TERMINAL LAYOUT	
	RTT TO SR745 WIRING DIAGRAM	
	INTERFACING TO THE RTT THROUGH THE ENERVISTA 745 SETUP PROGRAM	
	THE SR735/737 FEEDER PROTECTION RELAY	
	Overview SR735/737 Feeder Protection Relay Terminal Functions	
	RTT TO SR735/737 Wiring Diagram Interfacing to the RTT through the EnerVista 735/737 Setup Program	
	INTERFACING TO THE RTT THROUGH THE ENERVISTA 735/737 SETUP PROGRAM	46
3: USING THE RTT ON	CONFIGURATION OPTIONS	/17
UR SERIES RELAYS	Overview	
OK SENIES KELA I S	UR Series Relays Rear Terminal Layout	
	UR Series Relays Reak Terminal Layout UR Series Relays CT/VT Module - Terminal Functions	
	UR SERIES RELAYS CT7VT MODULE - TERMINAL FUNCTIONS UR SERIES RELAYS TRANSDUCER & DIGITAL I/O MODULES	.49
		FO
	- TERMINAL FUNCTIONS	
	RTT TO UR RELAY WIRING DIAGRAM	
	INTERFACING TO THE RTT THROUGH THE ENERVISTA UR SETUP PROGRAM	.56

4: MOTOR MANAGEMENT & METERING	THE 369 MOTOR MANAGEMENT RELAY Overview	61 62
	RTT TO 369 RELAY WIRING DIAGRAM INTERFACING TO THE RTT THROUGH THE ENVERVISTA 369 SETUP PROGRAM THE 239 MOTOR MANAGEMENT RELAY OVERVIEW 239 MOTOR MANAGEMENT RELAY TERMINAL LAYOUT	64 67 67
	239 Motor Management Relay Terminal Functions RTT to 239 Relay Wiring Diagram Interfacing to the RTT through the EnverVista 239 Setup Program	68 69
	THE 269/269 PLUS MOTOR MANAGEMENT RELAY Overview	72 73 75 76 79 79 79
	PQM/PQMII Power Quality Metering Systems Terminal Functions RTT to PQM/PQMII Relay Wiring Diagram Interfacing to the RTT through the EnverVista PQM Setup Program .	81
5: F650 FEEDER/BAY PROTECTION RELAY	THE F650 FEEDER/BAY PROTECTION RELAY Overview F650 Feeder/Bay Protection Relay Terminal Layout RTT to F650 Relay Wiring Diagram Interfacing to the RTT through the EnerVista F650 Setup Program	85 86 87





RTT Desktop Test Set

Chapter 1: Getting Started

1.1 Ordering

1.1.1 Ordering the RTT

Select the basic model and the desired features from the selection guide below:



1.2 About Your New RTT Unit

1.2.1 Cautions and Warnings



Before attempting to install or use the RTT unit, it is important that all DANGER and CAUTION indicators in this manual are reviewed in order to prevent personal injury, equipment damage and/or downtime. The above icons are used to indicate dangers, cautions and notes.

The standard **note** icon emphasizes a specific point or indicates minor problems that may occur if instructions are not properly followed.

The **caution** icon indicates that there may be possible damage to equipment or data if instructions are not properly followed.

The **danger** icon provides users with a warning about the possibility of serious or fatal injury to themselves or others.

1.2.2 Check the Contents of the Box

When you open the RTT box, you should find:

- one RTT unit
- one power cord
- one RTT-to-product connecting cable
- manual



If there is any noticeable physical damage, or if any of the contents of the box are missing, please contact GE Multilin immediately.

1.2.3 Using this Manual

This manual is designed with the assumption that you may or may not know about the principles of RTT usage. If you know little about RTT usage, please read carefully what is written below, bearing in mind that GE Multilin is available to fully support your questions about any aspect of the product.

If this is **not** the case, simply ignore those sections of the manual with which you are familiar.

The manual is structured to guide you through the entire installation and configuration process, from opening the box, to:

- physically connecting the associated relays
- setting up the associated relays for use with the RTT

- creating RTT outputs for each type of relay
- viewing information about your relays based on inputs from your RTT.

Any actions you have to undertake during any part of the installation and configuration processes, are indicated in the manual as follows:

 \triangleright Open the box.

This makes it easier to separate what you must physically **do**, from the surrounding product and process descriptions and explanations.

1.2.4 About the RTT

The RTT is a device that allows simple testing of electronic relays, by essentially simulating input conditions to the relay in question.

It includes a single phase supply, where both volts and amperes are adjustable via rotary knobs. It also includes eight circuits to drive the contact inputs of modern relays, as well as 2 contact outputs both monitored via LEDs. The RTT also has 3 channels of RTD resistance simulators.

The features of the RTT allow you to test several functions of the relay, such as overcurrent, overvoltage, directional units using the single phase source in a very easy and convenient way. The main application is rough testing of relays in the laboratory or the field. It may also be used for technicians and crew training purposes in a very cost effective way.

The unit is self powered from the mains and is able to work either at 50 or 60 Hz and all common voltage ranges, 110, 120, 230, 240 Vac. When it is used with a modern multimeter, it allows precise testing of relays and meters based on the comparison principle.

The equipment may be used with all modern digital relays that have low burden in their current and voltage inputs as well as low consumption digital inputs.

The figure below shows the RTT box and describes all its features..

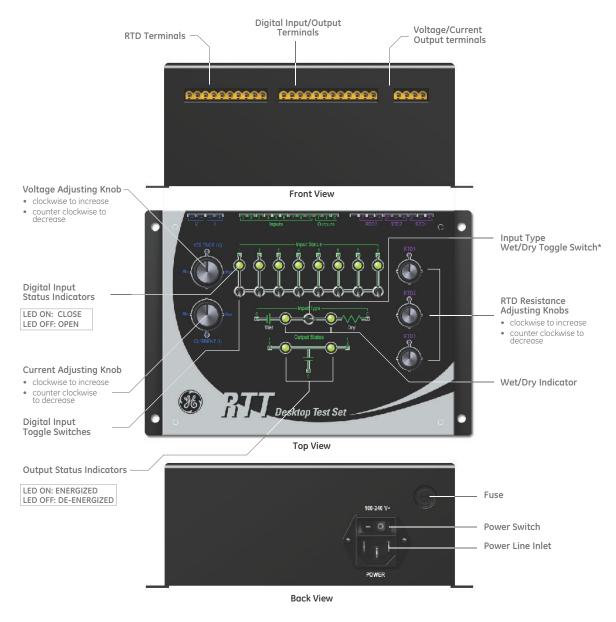


FIGURE 1–1: RTT Details

* In order to prevent accidental movement of the Wet/Dry toggle switch, the switch comes with a locking feature: you must pull it upward in order to toggle the RTT between "Wet" and "Dry" input.

The figure below shows the cable provided with the RTT. This cable is used to connect to all relays, although for some, it may have to be slightly modified. See the appropriate chapter for details.

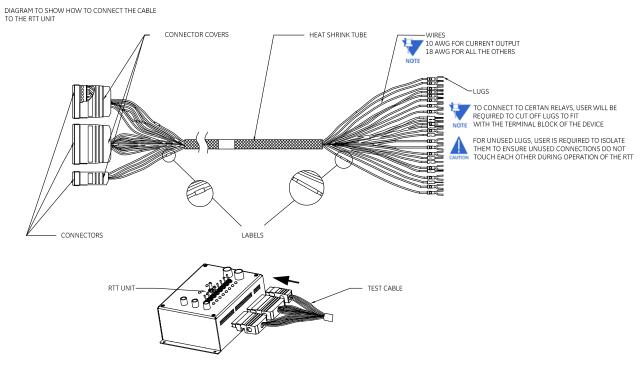


FIGURE 1-2: Connecting the Cable to the RTT Unit

The figure below shows the **wire labels** (see figure 1-2, above), that correspond to the RTT terminals..

R1+	RTD1 +	
	RTD1 -	
	RTD1 C	
	RTD2 +	
	RTD2 -	18 AWG
	RTD2 C	10/10/0
	RTD3 +	
	RTD3 -	
	RTD3 C	
	SPARE	

Output C	
Output 2	
Output 1	
Input C	
Input 8	
Input 7	18 AWG
Input 6	10 AVVG
Input 5	
Input 4	
Input 3	
Input 2	
Input 1	

Current I ₊	10 AWG
Current I_	10 400
Voltage V_+	18 AWG
Voltage V_	TO WAA

1.2.5 RTT Unit Specifications

LED INDICATOR LIGHTS

A single green LED is provided for each digital input from and output to the relay under test.

CONTROL POWER

NANOL.	
Nominal AC Voltage:	100 V to 240 V AC at 50/60 Hz
Min/Max AC Voltage:	85 V / 250 V AC at 47 to 63 Hz, 70 mA max.
AT 120 VAC INPUT	
Nominal:	3 VA
Maximum:	5 VA
AT 240 VAC INPUT	
Nominal:	6 VA
Maximum:	14 VA

FUSE¹

5 × 20mm, 80 mA, 250V Time-lag fuse Manufacturer and part number:LITTELFUSE: 218.080

AT 120 VAC INPUT	
Range:	0 to 3 A AC at 0.08 Ω CT Relay Burden
AT 240 VAC INPUT	
Range:	0 to 6 A AC at 0.08 Ω CT Relay Burden
Tolerance:	±10%

VOLTAGE OUTPUT

AT 120 VAC INPUT	
Range:	0 to 40.0 VAC
AT 240 VAC INPUT	
Range:	0 to 80.0 VAC
Tolerance:	±10%

RTD OUTPUT (NON-LINEAR)

For Wire Type:	3 wires
For Sensor Type:	100 Ω platinum, 100 Ω nickel, 120 Ω nickel
Resistance:	110 to 160 Ω
Tolerance:	±5%

DIGITAL INPUTS

DRT.	
Contact Resistance:	< 10 m Ω
Insulation Resistance:	> 1000 MΩ
WET:	
DC Voltage:	23.4 VDC @ 200mA
Tolerance:	±5%

1. Fuse Replacement:

- Disconnect Power Supply and remove fuse from its holder.

- Replace with a 80 mA, 250 V, time-lag fuse. Use ONLY fuses indicated in above specifications.

AMBIENT TEMPERATURE

Operating Range:	5°C to 40°C
Storage Range:	20°C to 70°C

PHYSICAL

Size: 7.5" L \times 5.75" W \times 3.25" D / 187 mm L \times 145 mm W \times 81 mm D Weight: 4.95 lb / 2.26 Kg

INTERNATIONAL STANDARDS COMPLIANT

When used with advanced protection relays such as the GE Multilin Universal Relay family, the RTT complies with most international standards requirements for test and measuring equipment: EN61326:1997 EN/IEC 61010-1:2001 cULus 61010-1

ENVIRONMENTAL

Indoor use	
Altitude:	Up to 2000 m
Recommended operating	
ambient temperature (T _{mra})	5°C to 40°C
Relative Humidity:	0 to 90%, non-condensing
Mains supply voltage fluctuations:	up to 10% of nominal voltage
Installation Category:	11
Max. Branch circuit:	20 A
Pollution Degree:	2

RTT TYPE TESTS

EMC TEST	STANDARD	CRITERIA
Electrostatic Discharge: Air and Direct	IEC 60255-22-2 / IEC 10004-2	4 KV Contact and 8 KV Air
Electrical Fast Transient/Burst Immunity-Capacitive Clamp	IEC 60255-22-4 / IEC 10004-4	2 KV, 5 KHz (Power), 1 KV 2.5 KHz (I/O)
Surge Immunity	IEC 60255-22-5 / IEC 10004-5	0.5 KV diff, 1 KV com
Voltage Dip; 2. Voltage Interruption	IEC 61000-4-11	0.5 cycle each polarity & 100%
RF Immunity 80 to 1000 MHz	IEC 60255-22-3 / IEC 61004-3 & ETP 5.2	10 V/m
Conducted RF Immunity 150 KHz to 80 MHz	IEC 60255-22-6 / IEC 10004-6	10 Vrms Am 80% mod
Power Frequency Magnetic Field Immunity	IEC 61000-4-8	30 A/m
Pulse Magnetic Field Immunity	EN/IEC 61000-4-9:1994, 2001	1000 A/m
Conducted Emissions EN61000-6-4:2001	IEC 60255-25 / CISPR22	Class A

EMC TEST	STANDARD	CRITERIA
Radiated Emissions EN61000-6-4:2001	IEC 60255-25 / CISPR22	Class A & B
ENVIRONMENTAL TESTS		
Relative Humidity Cyclic	EN/IEC 60068-2-30:2005	55°C, 93% RH, 6 days
Cold Temperature	IEC 60068-2-1	-40°C, 16 hours
Dry Heat Temperature	IEC 60068-2-2	+85°C, 16 hours
Sinusoidal Vibration	IEC 60255-21:1996, 1988; IEEE C37.1	10 Hz - 150 Hz, 1G, Z-axis
SAFETY TESTS		
Dielectric Strength	Per EN/IEC 61010-1	Up to 1700 VAC, 1 min
ISM-Safety	EN/IEC 61010-1	
ISM-Safety	UL/ULC 61010-1	





RTT Desktop Test Set

Chapter 2: Using the RTT on SR Series Relays

2.1 The 469 Motor Management Relay

2.1.1 Overview

The SR469 Relay has 3-phase current inputs with CT burden less than 0.2VA at rated load, 3 differential current inputs with the same CT burden and 3-phase voltage inputs with greater than 500KOHM VT burden. There are also 9 digital inputs designed for Dry contact connection only, and 6 Form-C output relays. The SR469 Relay monitors up to 12 RTD inputs, each RTD being field programmable as a 3-wire type of 100 Platinum, 100 Nickel and 120 Nickel.

All features of RTT can be applied to the SR469 Relay. Although there are no unused terminals on the RTT product cable, a modification to the cable is required in order to fit it to the SR469 terminals.

Modification of the Product Cable

For the wires related to contact inputs and RTDs (18 in total), cut the lugs off the wire, strip wire to make them fit to the SR469 terminals.

The lugs to be cut are: R1+, R1-, R1C, R2+, R2-, R2C, R3+, R3-, R3C, DIC, DI8, DI7, DI6, DI5, DI4, DI3, DI2 and DI1.

2.1.2 SR469 Motor Management Relay Terminal Layout

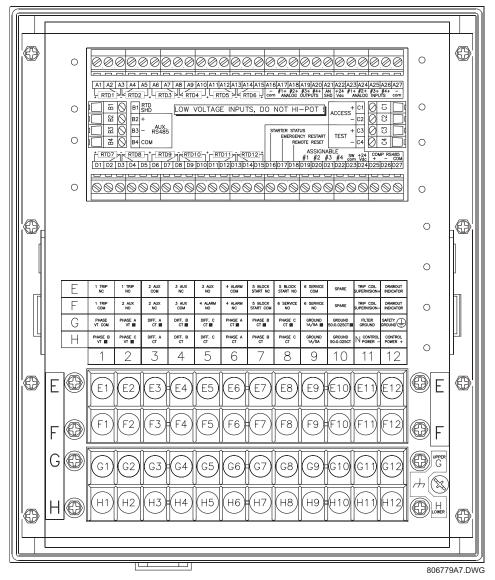


FIGURE 2-1: SR469 Terminal Layout

2.1.3 SR469 Motor Management Terminal Functions

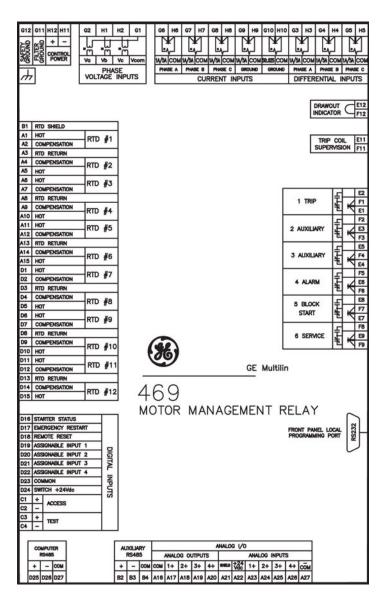


FIGURE 2-2: SR469 Terminal Functions Schematic

2.1.4 RTT to SR469 Wiring Diagram



- 1. Ensure that Wet/Dry Input Type switch is set to <u>DRY</u> before applying power to the RTT unit. The SR469 Relay accepts only **DRY** contact connections from the RTT.
- 2. Ensure that current and voltage knobs are turned fully counter-clockwise before applying power to the RTT unit.

	Table 2–1	.: SR469 v	vith RTT Set to Dry		
	RTD 3 +	A6		RTD3 +	
	RTD 3 -	A8		RTD3 -	
	RTD 3 COM	A7		RTD3 C	
	RTD 2 +	A5		RTD2 +	
RTDs	RTD 2 -	A3		RTD2 -	
RIDS	RTD 2 COM	A4		RTD2 C	
	RTD 1 +	A1		RTD1 +	
	RTD 1 -	A3		RTD1 -	
	RTD 1 COM	A2		RTD1 C	
				SPARE	

	1	-			
	AUX 3 COMMON	F4			
Contact	TRIP COMMON	F1		OUTPUT C	
Outputs*	AUX 3 NO	E5		OUTPUT 2	
	TRIP NO	E2		OUTPUT 1	
	Switch Common	D23		INPUT C	
	Access	C1		INPUT 8	
	Assignable #4	D22		INPUT 7	RTT
.	Assignable #3	D21		INPUT 6	
Contact Inputs	Assignable #2	D20		INPUT 5	
mputs	Assignable #1	D19		INPUT 4	
	Remote Reset	D18		INPUT 3	
	Emergency Restart	D17		INPUT 2	
	Starter Status	D16		INPUT 1	

CTs	la +	G6	 I ₊	
CIS	la COM	H6	 I_	
VTs	VA	G2	 V ₊	
VIS	Vn	G1	 V_	



*Trip and Alarm Common terminals (F1 and F4) must be hardwired together.

2.1.5 Interfacing to the RTT through the EnerVista 469 Setup Program

The following information describes how to configure the SR469 relays and how to monitor voltage and current inputs using the 469 Setup Software and the RTT.

2.1.5.1 Current

▷ **Setup**: Enter the Phase CT Primary, then press Save.

Current Sensing		
SETTING	PARAMETER	-
Phase CT Primary	OFF	Save
Motor Full Load Amps	OFF	
Ground CT Type	Multin CT 50/0.025	Rosto
Phase Differential CT Type	None	
Enable Two Speed Motor Option	Off/No	Defau
		Botha
2		
	SETTING Phase CT Primary Motor Full Load Amps Ground CT Type Phase Differential CT Type	SETTING PARAMETER Phase CT Primary OFF Motor Full Load Amps OFF Ground CT Type Muttin CT 50/0.025 Phase Offerential CT Type None

FIGURE 2–3: Current Setup

▷ **Metering**: The current values measuerd by the relay can be viewed on the following screen in real-time.

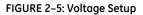
	Current		
	× SETTING	PARAMETER	
	 Phase A Current 	A	Si Si
Status	Phase B Current	A	1
Metering Data	Phase C Current	A	Be.
Current	Average Phase Current	A	
RTD	Motor Load	FLA	(+6) De
Voltage	Current Unbalance	%	
Speed	U/B Biased Motor Load	FLA	
Power	Ground Current	A	

FIGURE 2-4: Current Metering

2.1.5.2 Voltage

Setup: Configure the Voltage Connection Type, enter the Voltage Ratio, then press Save.

🗟 Device Setup 🔯 Quick Connect	🗑 Voltage Sensing // New Site 1:	469 Relay 1: Setti	🔳 🗖 🔀
	Voltage Sensing		
× ×	SETTING	PARAMETER	
New Site 1	VoltageTransformer Connection Type	Wye 💌	🖹 Save
- 469 Relay 1	Voltage Transformer Ratio	35.00 :1	
Device Definition Settings Setup System Setup	Motor Nameplate ∀oltage	4000 ∀	Bestore
Voltage Sensing Power System	469 Relay 1 Settings: System Setup		



▷ **Metering**: The voltage values measured by the relay can be viewed on the following screen in real-time.

Voltage			
	SETTING	PARAMETER	
New Site 1 Vab		V	Save
- 469 Relay 1		V	
Device Definition		V	Bestor
Settings Average Lin	ne Voltage	V	
⊕ 469 Setup Van		V	Defaul
E System Setup		V	
Current Sensing Vcn		V	
	hase_Voltage	V	
Power System System Fre	quency	Hz	

FIGURE 2-6: Voltage Metering

2.1.5.3 RTDs

Setup: Configure the RTD type and choose the application for each RTD.

	RTD Types			RTD #1		
- ×	SETTING	PARAMETER		SETTING	PARAMETER	1
Protection	Stator RTD Type	100 Ohm Platinum	2 Save	RTD #1 Application	None	
E Thermal Model	Bearing RTD Type	100 Ohm Platinum				
Current Elements	Ambient RTD Type	100 Ohm Platinum	Bestore	Copy From RTD	RTD1	
Motor Starting	Other RTD Type	100 Ohm Platinum			Сору	16
E RTD Temperature			Default			

FIGURE 2-7: RTD Setup

Metering: Monitor the RTD temperature measured by the relay, using the following screen in real-time.

	X RTD			
ew Site 1 469 Relav 1	RTD No.	Temperature	Application	Name
Device Definition	RTD #1 Temperature	No RTD	None	
	RTD #2 Temperature	No RTD	Stator	
Actual Values	RTD #3 Temperature	No RTD	Stator	
Status	RTD #4 Temperature	No RTD	None	
Metering Data	RTD #5 Temperature	No RTD	Stator	
Current	RTD #6 Temperature	No RTD	Stator	
BID	RTD #7 Temperature	No RTD	Bearing	
Voltage	RTD #8 Temperature	No RTD	Bearing	

FIGURE 2-8: RTD Metering

2.1.5.4 Contact Inputs Status

 \triangleright Use the following screen to monitor the status of the contact inputs as you manipulate the Contact Input Switch on the RTT.

	Inputs Status		
× ×	SETTING	PARAMETER	
ew Site 1 🗾	Access Switch Status	Open	The Sav
469 Relay 1	Test Switch Status	Open	
Device Definition	Starter Switch Status	Open	Best
Settings	Emergency Restart Switch Status	Open	
Actual Values	Remote Reset Switch Status	Open	The Defu
📮 Status	Assignable Input 1 Status	Open	10.000
Motor Status	Assignable Input 2 Status	Open	
Trip Status	Assignable Input 3 Status	Open	
Alarm Status	Assignable Input 4 Status	Open	
Inputs Status	Trip Coll Supervision	No Coll	

FIGURE 2-9: Contact Inputs Status

2.1.5.5 Contact Outputs Testing

The two contact outputs monitored by the RTT shold match the status shown in the EnerVista 469 Setup.

Settings	Test Output Relays	
- 469 Setup	SETTING	PARAMETER
stem Setup	TEST OUTPUT RELAYS	
	Force Operation of Relays	Disabled
gital Inputs	R1 Trip	
put Relays	R2 Auxiliary	
tection	R3 Auxiliary	
nitoring	R4 Auxiliary	
	R5 Alarm	
alog 1/0	R6 Service	
469 Testing Simulation Mode Pre-Fault Setup Fault Setup Test Output Relays		

FIGURE 2-10: Contact Outputs Testing

2.2 The SR750/760 Feeder Management Relay

2.2.1 Overview

The SR750/760 Relay has 3-phase current inputs with a CT burden less than 0.2 VA at rated load, and 3-phase voltage inputs with a greater than 576 KW VT burden. External contacts can be connected to the Relay's 14 logic inputs. These contacts can be either Dry or Wet (which requires external source voltage greater than 30VDC). The SR750/760 Relay is equipped with 8 output relays: three special purpose and five general purpose.

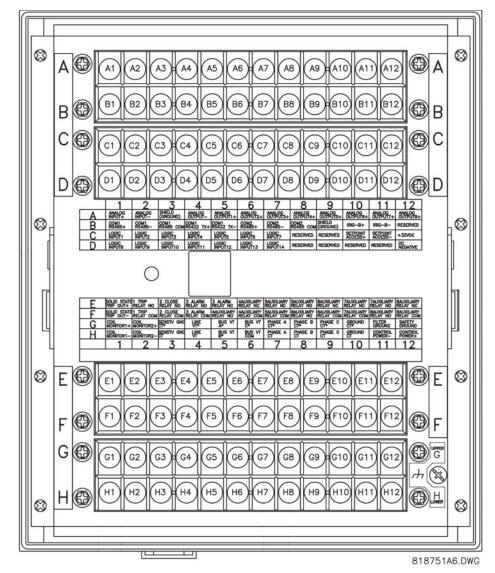
As the DC voltage of RTT Wet doesn't meet SR750/760 requirement, only the Dry connection is applicable. As there is no RTD feature in SR750/760, no modification of the Test Cable is required.



Unused Wires

For the unused wires (9 in total), it is recommended that the user tape the lugs to ensure isolation of the contacts so that no problems are caused by wires touching.

The unused wires are: R1+, R1-, R1C, R2+, R2-, R2C, R3+, R3- and R3C.



2.2.2 SR750/760 Feeder Management Relay Terminal Layout

FIGURE 2-11: SR750/760 Terminal Layout

2.2.3 SR750/760 Feeder Management Relay Terminal Functions

G7	H7	G8	H8	G9	н9	G3	13 G	10H	10	G5	•	15	Ge	5 1	H6	G	4	H4		H11	H12	G1	1 G12
1 _A	N	Ъ	N	^I c	N	I _{sq} I	sg	IG I	N	VA	1	в	Vc	V	COM	V	,	V2		-	+	25	2 2≿
T¥	1	Ň		Ň	1	N	1T	N	ПI	Ť	1	Ť.	Ť	+	1	F	t	Ţ	11	CONT	ROL	FILTER	GROUND
E.	1	L۹	ן ג		ן ב	۱	1	⊡ ∧	1 1	-h		ĿΜ	- H	ว่			"	ſ	ΙL	FUR	ER	"	-
PHASE	ΕA			PHAS	EC		ROUN	ID		_		PHA	SE	05.1		Ţ	SYN	Ċ.	1				th
-			COR		INPU	//5			_	_				GEI	NPU	15	1					1.	
																		CO	LM	ONIT	OR	1÷	G1 H1
	_																ł	-				+	G2
C1	LO	GIC II	NPUT	1					C									COI	LM	ONIT	OR :	2	H2
C2	LO	GIC I	NPUT	2				((Y	5)								_				-	-
C3	-		NPUT	-		4			6				GE	Multi	lin				SOL	ID S	TATE		E1
C4	-		NPUT	-		4		750	1/	760			_					ŀ	_	TRIP	·	-	F1
C5	-		NPUT	-						r M		aae	m	ent	R	ela	٧l			1 TR	RIP	Æ	E2 F2
C6			NPUT	-		-						-9-					1	ŀ				+-	E3
C7	-		NPUT	7		-													2	CLO	DSE	Æ	F3
C8 C9	-	SERM				-												ŀ				+-	E4
	-	SERM				-															LIARY	L.	F4
C10	+		T AC		_	-0													5,		LIMAN	Æ	E5
C11 C12	-		IT AC	CESS	+	INPUTS												2				+_	- F5
D1		2VDC																RELAYS	4		LIARY	F	F6
D1 D2			NPUT	-		- COG													· · /			F	E6
D2			NPUT	-		43												оитрит				╞	E8
D4	-		NPUT			-												51	5		LIARY	L.F.	F7
D5	-		NPUT	_															5,			1×	E7
D6	-		NPUT			-												h				1-	- F8
D7			NPUT			1		BACK	DA	NET									6 /	AUXI	LIARY	L.	F9
D8		SERM						ETH	ERN	ET												1E	E9
D9	-	SERM						POR	T R	J45			RON	IT F	PAN	-		I				L	E11
D10	-	SERM						Г	~		L		LF		RA		1G		7 /	AUXI	LIARY	1 the	F10
D11	RE	SERM	ED					L	_				-			2						E	E10
D12	DC	NEG	ATIVE						Γ	_			/F	823	2	/			-	-	-		- F11
																			8 5	WAR	-TES	Įŧ	F12
									~								l					T	E12
	Г		Т						_		CO	MMU	NIC	ATIO	NS		_						
		RIG	1	Τ	CON	12		С	OM	1							ANA	LOC					
	1	-В	SHIELD		RS4	85	RS4	122	R	S48	5	INP	UΤ					OUT	PUT	s			
	E-	+	16	60	-	+	TX	TX +	сом	_	+	+	-	SLD	_	1+	2+	3+	4+	5+	6+	7+	8+
В	в	В	_	_	В	B	- B	+ B	B	В	В	A	A	A	A	A	A	A	A	A	A	A	A
12	11			8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	9	10	11	12

FIGURE 2-12: SR750/760 Terminal Functions Schematic

2.2.4 RTT to SR750/760 Wiring Diagram



1. Ensure that Wet/Dry Input Type switch is set to <u>DRY</u> before applying power to the RTT unit. The SR750 Relay accepts only **DRY** contact connections from the RTT.

2. Ensure that current and voltage knobs are turned fully counter-clockwise before applying power to the RTT unit.

Table 2-2: SR750/760 with RTT Set to Dry

RTDs*	
NID5	

RTD3 +	
RTD3 -	
RTD3 C	
RTD2 +	
RTD2 -	
RTD2 C	
RTD1 +	
RTD1 -	
RTD1 C	
SPARE	

	CLOSE COMMON	F3]		
Contact	TRIP COMMON	F2		OUTPUT C	
Outputs**	CLOSE NO	E3		OUTPUT 2	
	TRIP NO	E2		OUTPUT 1	
	+32 V DC	C11		INPUT C	
	Logic Input 7	C7		INPUT 8	
	Logic Input 6	C6		INPUT 7	RTT
.	Logic Input 5	C5		INPUT 6	
Contact Inputs	Logic Input 4	C4		INPUT 5	
mputs	Logic Input 3	C3		INPUT 4	
	Logic Input 2	C2		INPUT 3	
	Logic Input 1	C1		INPUT 2	
	Access	C10		INPUT 1	

CTs	la (5A)	G7	 I+	
CIS	la COM	H7	 I_	-
VTs	VA	H6	 V ₊	-
VIS	Vn	G5	 V_	-



*750/760 doesn't have RTD function.

**Trip and Alarm Common terminals (F2 and F3) must be hardwired together.

2.2.5 Interfacing to the RTT through the EnerVista 750/760 Setup Program

The following information describes how to configure the SR750/760 relays and how to monitor voltage and current inputs using the 750_760 Setup Software and the RTT.

2.2.5.1 Current

▷ **Setup**: Enter the Phase CT Primary then Save

	Sensing	
	SETTING	PARAMETER
'50 760 Relav 1	Current Sensing	
Device Definition	Phase CT Primary	1000 A
	Ground CT Primary	50 A
Settings Belav Setup	Sensitive Ground CT Primary	1000 A
System Setup		
Sensing	Bus VT Sensing	
FlexCurve A	Bus VT Connection Type	Wye
FlexCurve B	Bus Nominal VT Secondary Voltage	120.0 V
Logic Inputs	Bus VT Ratio	120.0 : 1

FIGURE 2-13: Current Setup

Metering: View the current values measured by the relay, in realtime.

	Current.	
	PARAMETER	VALUE
New Site 1	Percent of Load-to-Trip	%
Device Definition	Average Current	A
Settings	Phase A RMS Current	A
Actual Values	Phase A Current Angle	?Lag
Status	Phase B RMS Current	A
Metering	Phase B Current Angle	?Lag
Current	Phase C RMS Current	A
Voltage.	Phase C Current Angle	?Lag
Synchronizing Voltage	Neutral Current	A
Power	Neutral Current Angle	?Lag
i owol	Positive Sequence Current Magnitude	A

FIGURE 2–14: Current Metering

2.2.5.2 Voltage

Setup: Configure the Bus VT Connection Type, enter the Bus VT Ratio, then Save.

	Sensing	
	SETTING	PARAMETER
750_760 Relay 1	Current Sensing	
Device Definition	Phase CT Primary	1000 A
	Ground CT Primary	50 A
Relay Setup	Sensitive Ground CT Primery	1000 A
System Setup		
Sensing	Bus VT Sensing	
FlexCurve A	Bus VT Connection Type	Wye
FlexCurve B	Bus Nominal VT Secondary Voltage	120.0 V
	Bus VT Ratio	120.0:1
Logic Inputs Output Relays		
- Output Heldys	Line VT Sensing	

FIGURE 2–15: Voltage Setup

Metering: View the voltage values measured by the relay, in realtime

	Voltage.	
1×	PARAMETER	VALUE
ew Site 1	A-B RMS Voltage	kV
750_760 Relay 1	A-B Voltage Angle	?Lag
Device Definition	B-C RMS Voltage	kV
🙂 Settings	B-C Voltage Angle	?Lag
Actual Values	C-A RMS Voltage	KV
🛨 Status	C-A Voltage Angle	?Lag
- Metering	A-N RMS Voltage	KV
Current.	A-N Voltage Angle	?Lag
Voltage.	B-N RMS Voltage	KV
Synchronizing Voltage	B-N Voltage Angle	?Lag
Power	C-N RMS Voltage	KV
Energy	C-N Voltage Angle	?Lag
Demand	Nertral Voltana	W

FIGURE 2–16: Voltage Metering

2.2.5.3 Logic Inputs Status

▷ Use the following screen to monitor the status of the contact inputs as you manipulate the Contact Input Switch on the RTT.

<u>×</u>	Hardware Input		
	PARAMETER	VALUE	
750_760 Relay 1	Contact 1	Open	
Device Definition	Contact 2	Open	
E Settings	Contact 3	Open	
Actual Values	Contact 4	Open	
E Status	Contact 5	Open	
Virtual Inputs	Contact 6	Open	
Clock	Contact 7	Open	
Last Trip Data	Contact 8	Open	
Fault Locations	Contact 9	Open	
Hardware Input	Contact 10	Open	
Metering	Contact 11	Open	
Maintenance	Contact 12	Open	
maintenance			

FIGURE 2–17: Logic Inputs Status

2.2.5.4 Contact Outputs Testing

The two contact outputs monitored by the RTT should match the status shown in the EnverVista 750/760 Setup.

1	X Output Relays-Testing	
ew Site 1	▲ SETTING	PARAMETER
750_760 Relay 1	Force Output Relays Function	Disabled
Device Definition	Force 1 TRIP Relay	De-energized
 Settings 	Force 2 CLOSE Relay	De-energized
Relay Setup	Force 3 AUXILIARY Relay	De-energized
System Setup	Force 4 AUXILIARY Relay	De-energized
Logic Inputs	Force 5 AUXILIARY Relay	De-energized
+ Output Relays	Force 6 AUXILIARY Relay	De-energized
Protection	Force 7 AUXILIARY Relay	De-energized
Monitoring	Force 8 SELF-TEST WARNING Relay	De-energized
E Testing	Force Solid State Output	De-energized
Simulation Output Relays-Testing Output Relays-Testing Output Relays-Testing Analog Outputs-Testing		

FIGURE 2–18: Contact Outputs Testing

2.3 The SR489 Generator Management Relay

2.3.1 Overview

The SR489 Relay has 3-phase current inputs with CT burden less than 0.2 VA at rated load, 3 differential current inputs with the same CT burden and 3-phase voltage inputs with greater than 500 KOHM VT burden. There are also 9 digital inputs designed for Dry contact connection only, and 6 Form-C output relays. The SR489 Relay monitors up to 12 RTD inputs, each RTD being field programmable as a 3-wire type of 100 Platinum, 100 Nickel and 120 Nickel.

All features of RTT can be applied to the SR489 Relay. There are no unused terminals on the RTT product cable. However a modification is required to the cable to fit to the SR489 terminals.

Modification of the Product Cable

For the wires related to contact inputs and RTDs (18 in total), cut the lugs off the wire, strip wire to make them fit the SR489 terminals.

The lugs to be cut are: R1+, R1-, R1C, R2+, R2-, R2C, R3+, R3-, R3C, DIC, DI8, DI7, DI6, DI5, DI4, DI3, DI2 and DI1.

2.3.2 SR489 Generator Management Relay Terminal Layout

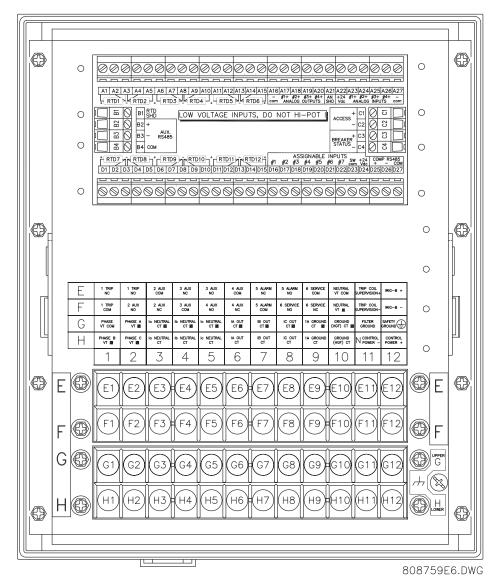


FIGURE 2-19: SR489 Relay Terminal Layout

2.3.3 SR489 Generator Management Relay Terminal Functions

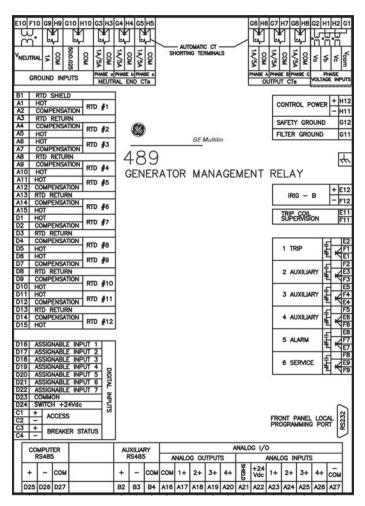


FIGURE 2-20: SR489 Relay Terminal Functions Schematic

2.3.4 RTT to SR489 Wiring Diagram



- 1. Ensure that Wet/Dry Input Type switch is set to <u>DRY</u> before applying power to the RTT unit. The SR489 Relay accepts only **DRY** contact connections to the RTT.
- Ensure that current and voltage knobs are turned fully counter-clockwise before applying power to the RTT unit.
 Table 2–3: SR489 with RTT Set to Dry

Tuble 2–3. 3K469 With KTT Set to DTy						
	RTD 3 +	A6		RTD3 +		
	RTD 3 -	A8		RTD3 -		
	RTD 3 COM	A7		RTD3 C		
	RTD 2 +	A5		RTD2 +		
RTDs	RTD 2 -	A3		RTD2 -		
KID5	RTD 2 COM	A4		RTD2 C		
	RTD 1 +	A1		RTD1 +		
	RTD 1 -	A3		RTD1 -		
	RTD 1 COM	A2		RTD1 C		
				SPARE		

	ALARM COMMON	F7]i		
Contact	TRIP COMMON	F1		OUTPUT C	
Outputs*	ALARM NO	E8		OUTPUT 2	
	TRIP NO	E2		OUTPUT 1	
	Switch Common	D23		INPUT C	
	Assignable #6	D21		INPUT 8	
	Assignable #5	D20		INPUT 7	RTT
.	Assignable #4	D19		INPUT 6	
Contact Inputs	Assignable #3	D18		INPUT 5	
mputs	Assignable #2	D17		INPUT 4	
	Assignable #1	D16		INPUT 3	
	Access	C1		INPUT 2	
	Breaker Status	C3		INPUT 1	

CTs	la +	G6
CIS	la COM	H6
VTs	VA	G2
VIS	Vn	G1

I ₊	
I_	
V ₊	
V_	



*Trip and Alarm Common terminals (F1 and F7) must be hardwired together.

2.3.5 Interfacing to the RTT through the EnerVista 489 Setup Program

The following sections demonstrate how to navigate, configure, and monitor the operation of the SR489 throught EnerVista 489 Setup.

2.3.5.1 Current

▷ **Setup**: Enter the Phase CT Primary, then Save

	Current Sensing		
	SETTING	PARAMETER	
	PHASE CURRENT		
Device Definition	Phase CT Primary	10 A 🔁	
E Settings	GROUND CURRENT		
SR489 Setup System Setup Current Sensing Voltage Sensing Gen Parameters	Ground CT 89 Relay 1 Settings: Sy	None stem Setup	

FIGURE 2-21: Current Setup

▷ **Metering**: View the current values measured by the relay, in realtime.

	Current Metering		
× ×	Phase A Output Current	A	
New Site 1		A	
- 489 Relav 1	Phase C Output Current	A	
Device Definition	Phase A Neutral-Side Current	A	
Settings	Phase B Neutral-Side Current	A	
Actual Values	Phase C Neutral-Side Current	A	
E Status	Average Phase Current	A	
Metering Data	Generator Load	% FLA	
Current Metering	Negative Sequence Current	% FLA	
RTD Temperature	Phase A Current Angle	0	
The remperatore	Diverse D. Comment Avenue	-	



2.3.5.2 Voltage

Setup: Configure the Voltage Connection Type, enter the Transformer Ratio, then Save

	Voltage Sensing			
<u>• ×</u>	SETTING	PARAMET	ER	
lew Site 1	VOLTAGE TRANSFORMER			
489 Relay 1	VT Connection Type	Wye	-	
Device Definition	Transformer Ratio	5.00:1		
E Settings	Neutral Voltage Connection	No		
SR489 Setup				
System Setup				
Current Sensing				
Voltage Sensing				
Gen. Parameters				
Serial Start-Stop	489 Relay 1 Settings: System :	Tahun		
+ Disital Incuts	409 Kelay 1 Settings: System :	secup		

FIGURE 2-23: Voltage Setup

Metering: View the volatage values measured by the relay, in realtime.

	Voltage		
	SETTING	PARAMETER	
New Site 1	Vab	V	The Sava
= 489 Relay 1	Vbc	V	
	Vca	V	Basto
	Average Line Voltage	V	
	Van	V	Defou
	Vbn	V	23.00100
Current Sensing	Vcn	V	
Voltage Sensing	Average_Phase_Voltage	V	
Power System	System Frequency	Hz	

FIGURE 2-24: Voltage Metering

2.3.5.3 RTDs

▷ Setup: Configure the RTD type and the application for each RTD

🐑 System Setup	RTD Types			RTD #1	
Digital Inputs	SETTING	PARAMETER		SETTING	PARAMETER ^
Output Relays	Stator RTD Type	100 Ohm Platinum	Ba Save	APPLICATION	
Protection	Bearing RTD Type	100 Ohm Platinum		RTD#1 Application	None 💌
Current Elements	Ambient RTD Type	100 Ohm Platinum	Pa Restore	And a second	
Voltage Elements	Other RTD Type	100 Ohm Platinum		ALARM	
Power Elements			Default		
BTD Temperature			Brochadh	TRIP	
RTD Types				2	
BTD #1				COPY SETTINGS	PTD#1

FIGURE 2-25: RTD Setup

Metering: Monitor the RTD temperature measured by the relay, in real-time.

	RTD				
New Ske 1 - 489 Relay 1	A RTD No.	Temperature	Application	Name	
Device Definition	RTD #1 Temperature	No RTD	None		
Settings	RTD #2 Temperature	No RTD	Stator		
E Actual Values	RTD #3 Temperature	No RTD	Stator		
Status	RTD #4 Temperature	No RTD	None		
 Metering Data 	RTD #5 Temperature	No RTD	Stator		
Current	RTD #6 Temperature	No RTD	Stator		
RTD	RTD #7 Temperature	No RTD	Bearing		
Votere	RTD #8 Temperature	No RTD	Bearing		

FIGURE 2–26: RTD Metering

2.3.5.4 Contact Inputs Status

▷ Use the following screen to monitor the status of the contact inputs as you manipulate the Contact Input Switch on the RTT.

	Digital Inputs		
- XX	SETTING	PARAMETER	
489 Relay 1	Access Switch	opened	
Device Definition	Breaker Status Switch	opened	
Settings	Digital Input 1	opened	
Actual Values	Digital Input 2	opened	
⊡ — Status	Digital Input 3	opened	
Generator Status	Digital Input 4	opened	
Last Trip Data	Digital Input 5	opened	
Trip Pickups	Digital Input 6	opened	
Alarm Pickups	Digital Input 7	opened	
Digital Inputs	Trip Coll Supervision	No Coll	
Real Time Clock.			

FIGURE 2-27: Contacts Inputs Status

2.3.5.5 Contact Outputs Testing

The two contact outputs monitored by the RTT should match the status shown in the EnerVista 489 Setup.

SR489 Setup	Test Output Relays //	New Site 1: 489 Rela	y 1: Settings: SR489 Testing
 System Setup 			
 Digital Inputs 	Test Output Relays		
 Output Relays 			
+ Protection	SETTING	PARAMETER	
Monitoring	TEST OUTPUT RELAYS		
+ Analog 1/0	Force Operation of Relays	Disabled	
SR489 Testing	R1 Trip		
Simulation Mode	R2 Auxiliary		
Pre-Fault Setup	R3 Auxiliary		
Fault Setup	R4 Auxiliary		
Test Output Relays	R5 Alarm		
Test Analog Outputs	R6 Service		

FIGURE 2-28: Contact Outputs Testing

2.4 The SR745 Transformer Management Relay

2.4.1 Overview

The SR745 Relay has three groups of 3-phase current inputs with CT burden less than 0.2 VA at rated load and has one voltage input with VT burden less than 0.025 VA at rated 120 V. External contacts can be connected to the relay's 16 logic inputs. These contacts can be either Dry or Wet (which requires an external source voltage greater than 30 VDC). The SR745 Relay is equipped with 8 output relays. The SR745 Relay provides one 3-wire RTD input which can be field programmable as a 3-wire type of 100 Platinum, 100 Nickel and 120 Nickel.

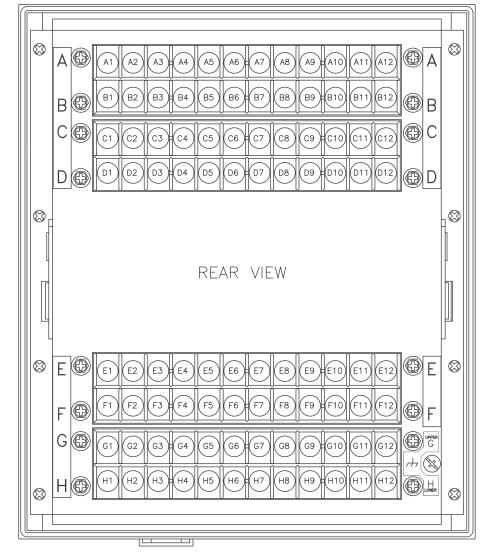
All features of RTT can be applied to the SR745 Relay, but only one RTD is used. No modification to the Test Cable is required.



Unused Wires

For the unused wires (6 in total), it is recommended that user tape the lugs to ensure isolation of the contacts and so that no problems are caused by wires touching.

The unused wires are: R2+, R2-, R2C, R3+, R3- and R3C.



2.4.2 SR745 Transformer Management Relay Terminal Layout

FIGURE 2-29: SR745 Relay Terminal Layout

G1 H2 G2 H3 G3 H10	1A = 1A 1B = 1C = 1C G1/2 = G1/2				- 7 1		sfor	me						FII SA	FE RE	R	ROL ER GNI GN	H12 H11 D G11 D G12 ZZZ B8 B9
	G2/3• G2/3	*		CLIRRENT INDUTS		(ela)	y -					_				RTD		B10 B11 B12
H4 G5 H5 G6	2a 2a = 2b 2b = 2c 2c =											CIRCUITS	so	TI TI TI	RIP RIP RIP RIP RIP RIP RIP RIP		=	+ E1 - F1 E2 F2 E3 F3 E4 F4
D1 D2 D3 D4 D5 D6	LOGI LOGI LOGI LOGI LOGI			<u> </u>	1 2 3 4 5 6					LOGIC		OUTPUT CIF		UX	RIP 5		+	E5 F5 E6 F6 E7
D7 D8 D9 D10	LOGI LOGI	CIN		JT JT	78				DED) IN	CATEL	>		4	UX	ILIA 7	RY		F7 E8 F8
D11 D12 C1 C2	LOGIO LOGIO LOGIO			IT JT			\rightarrow	+) CO	M)				A	UX	ILIA 8	RY	7	E9 F9 E10 F10
C3 C4 C5 C6 C7 C8	LOGI LOGI LOGI LOGI LOGI			<u> </u>	11 12 13 14 15	2 3 4 5				LOGIC			S	ELF	—Т	EST		<u>F10</u> E11 F11
C9 C10 C11	RESE RESE VT	RVE	ED				1.11		\T!/	VT SPARE								
COM2 RS485 - B7	RS422T5	COM	5485 1		ANA	LOG	5 8 8 + A3	LOAD		NAL 1+ A6		, 3+ A8	_		ר ה 	_		RS232

2.4.3 SR745 Transformer Management Relay Terminal Functions

FIGURE 2–30: SR745 Relay Terminal Functions Schematic

2.4.4 RTT to SR745 Wiring Diagram



- 1. Ensure that Wet/Dry Input Type switch is set to **DRY** before applying power to the RTT unit. The SR745 Relay accepts only dry contact connections to the RTT.
- 2. Ensure that current and voltage knobs are turned fully counter-clockwise before applying power to the RTT unit.

Table 2–4: SR745 with RTT Set to Dry

			RTD3 +	
			RTD3 -	
			RTD3 C	
			RTD2 +	
RTDs*			RTD2 -	
KTD3			RTD2 C	
	RTD RTD HOT	B10	 RTD1 +	
	RTD RETURN	B12	 RTD1 -	
	RTD COMP	B11	 RTD1 C	
			SPARE	

	TRIP 3 COMMON	F3]		
Contact	TRIP 2 COMMON	F2		OUTPUT C	
Outputs**	TRIP 3 NO	E3		OUTPUT 2	
	TRIP 2 NO	E2		OUTPUT 1	
	Logic Power Out +	D11		INPUT C	
	Logic Input 7	D7		INPUT 8	
	Logic Input 6	D6		INPUT 7	RTT
	Logic Input 5	D5		INPUT 6	
Contact Inputs	Logic Input 4	D4		INPUT 5	
mpats	Logic Input 3	D3		INPUT 4	
	Logic Input 2	D2		INPUT 3	
	Logic Input 1	D1		INPUT 2	
	Assess -	D10		INPUT 1	

CTs	Winding 1 I _a +	H1	 I+	
CIS	Winding 1 I _a -	G1	 I_	
VTs	VT	C11	 V ₊	
VIS	VT COM	C12	 V_	



*The 745 Relay has only one channel of RTD input.

**Trip 2 and Trip 3 Common terminals must be hardwired together.

2.4.5 Interfacing to the RTT through the EnerVista 745 Setup Program

The following sections demonstrate how to navigate, configure and monitor the operation of the SR745 using the EnerVista 745 Setup program.

2.4.5.1 Current

▷ Setup: Enter the W1 Phase CT Primary, then Save.

(a fast	Windings 1	
×	SETTING	PARAMETER
1 🔺	VV1 Nominal Phase-to-Phase Voltage	220.0 kV
Definition	VVI Rated Load	100.0 MVA
\$	W1 Phase CT Primary	500 : 0 A
5 Setup	W1 Ground CT Primary	500 : 0 A
tem Setup	W1 Series 3-Phase Resistance	10.700 Ohm
Transformers		
Vindings		

FIGURE 2-31: Current Setup

Metering: View the current values measured by the relay, in realtime.

	Phase/Ground Phasors		
× ×	SETTING	PARAMETER	
lew Site 1	View Phasors	VIEW	
745 Relay 1	WINDING 1		
Device Definition	VV1 la Magnitude	A	
Settings	W1 la Angle	?Leg	
 Actual Values 	VV1 lb Magnitude	A	
E Status	W1 lb Angle	?Lag	
E Metering	VV1 Ic Magnitude	A	
E Currents	W1 Ic Angle	?Lag	
Phase/Ground & Pt	W1 In Magnitude	A	
Sequence	W1 In Angle	?Leg	
Diff./Restraint	VVI Ig Magnitude	A	
Gnd Differential	W1 lg Angle	9Log	
Harmonic Contents	W1 Loading	% rated	
	CAM Farrier		

FIGURE 2–32: Current Metering

2.4.5.2 Voltage

▷ **Setup**: Enable the Voltage Sensing, enter the VT ratio, then Save.

levice Setup 🕼 Quick Connect	Voltage Input // New Site Voltage Input	1: 745 Relay 1: Settings: S
Device Definition Settings T45 Setup Transformers Windings Onload Tap Changer Harmonics Derating FlexCurves Voltage Input Voltage Input	SETTING Voltage Sensing Voltage Input Parameter Nominal VT Secondary Voltage VT Ratio	PARAMETER Disabled WII Van 1200 W 213 1000 :1

FIGURE 2-33: Voltage Setup

Metering: View the voltage values measured by the relay, in realtime

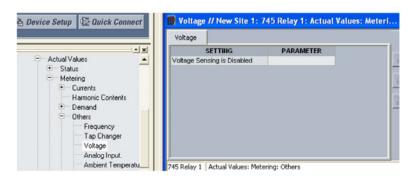


FIGURE 2-34: Voltage Metering

2.4.5.3 RTDs

Setup: Enable the Ambient Temperature Sensing, and configure the RTD type.

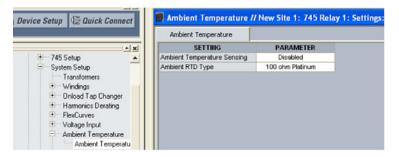


FIGURE 2-35: RTD Setup

Metering: Monitor the RTD temperature measured by the relay, in real-time.

Device Setup 😰 Quick Connect	🐻 Ambient Tempera	ature. // New Site	1: 745 Relay 1
	Ambient Temperature	э.	
× ×	SETTING	PARAMETER	
Actual Values Status Generating Currents Harmonic Contents Demand Others Frequency Tap Charger Votage Analog Input.	Ambient Temperature		
Amaiog Input. Ambient Temperatu	745 Relay 1 Actual Value	es: Metering: Others	

FIGURE 2-36: RTD Metering

2.4.5.4 Contact Inputs Status

	Logic Inputs		
	× SETTING	PARAMETER	
	Logic Input 1 Assert	Not Asserted	
Relav 1	Logic Input 2 Assert	Not Asserted	
Device Definition	Logic Input 3 Assert	Not Asserted	
Settings	Logic Input 4 Assert	Not Asserted	
Actual Values	Logic Input 5 Assert	Not Asserted	
E Status	Logic Input 6 Assert	Not Asserted	
Targets	Logic Input 7 Assert	Not Asserted	
Logic Inputs	Logic Input 8 Assert	Not Asserted	
- Virtual Inputs	Logic Input 9 Assert	Not Asserted	
Output Relays	Logic Input 10 Assert	Not Asserted	
Virtual Outputs	Logic Input 11 Assert	Not Asserted	
Self-Test Errors	Logic Input 12 Assert	Not Asserted	
	Logio Innut 12 Account	Most & conceptored	

▷ Use the following screen to monitor the status of the contact inputs as you manipulate the Contact Input Switch on the RTT.

FIGURE 2–37: Contact Inputs Status

2.4.5.5 Contact Outputs Testing

The two contact outputs monitored by the RTT should match the status shown in the EnerVista 745 Setup.

	Output Relays.		
- X	SETTING	PARAMETER	
New Site 1	Force Output Relays Functions	Disabled	
745 Relay 1	Force Output Relay 1	De-energized	
Device Definition	Force Output Relay 2	De-energized	
Settings	Force Output Relay 3	De-energized	
	Force Output Relay 4	De-energized	
System Setup	Force Output Relay 5	De-energized	
Logic Input	Force Output Relay 6	De-energized	
Elements	Force Output Relay 7	De-energized	
Outputs	Force Output Relay 8	De-energized	
	Force Self-Test Relay	De-energized	
 Output Relays. Output Relays. 			

FIGURE 2–38: Contact Outputs Testing

2.5 The SR735/737 Feeder Protection Relay

2.5.1 Overview

The SR735/737 Relay has 3-phase current inputs with a CT burden 0.02 VA at rated load. The SR745 Relay is equipped with three separate dry contact relays - TRIP, AUX and SERVICE. TRIP and AUX are identical non-fail-safe Form A contacts, both of which close whenever the unit trips. The SERVICE relay is in failsafe mode.

As the SR735/737 Relay doesn't have Voltage Input, Contact Input and RTD features, no modification to the Test Cable is required.



Unused Wires

For the unused wires (20 in total), it is recommended that user tape the lugs to ensure isolation of the contacts so that no problems are caused by wires touching.

The unused wires are: R1+, R1-, R1C, R2+, R2-, R2C, R3+, R3-, R3C, DIC, DI8, DI7, DI6, DI5, DI4, DI3, DI2, DI1, V+ and V-.

G5	1	₄	ł	Gŕ	I H1	G2	H2	G3	H3	G4	H4
H5	J	TRIP	ίſ			Ν	Ŋ	Ν	R		
G6	1	TRIP	1		·/-/	•			~	•	
H6	J	AUX.	iŀ	PH	ASE 1	PHAS CUE	SE 2 RRENT	PHAS INPL		GRC	DUND
G7											A2
H7	Ŧ	SERVICE								PHASE TIMED ;	● B1 ← A1
G8	₫	S								PHASE B TIMED :	B2 B3
											[₹] A3
Н9	+	Т]	(-eje	,				PHASE C	A5 B4
\vdash		\neg	RS485 (RS422 RX)					er Manaç	jernent		⁷ A4
H10	-	4	RS4 RS42:		735	5/7	37			GND	B5
H8	SHIEL)		FEED)ER	REL	ΑY		ĮЦ	Έ <u>Α6</u>
G9	+		RS422TX OPTION							PHASE A INST	A8 B7
G10	-		RS42								[€] A7
H12	+			,						PHASE B NST	B8 B9
		CO	NTR	OL R							⁷ 4 A9
H11	-			_						PHASE C NST	A11 E B10
G11	FGND	GR	ROUN	ND K							[™] A10
G12	SGND	S/ GR	AFET	Y VD						GND NST	B11
-83	CHASS	SIS	GRO	UNI	D SCRE	W					[€] A12

2.5.2 SR735/737 Feeder Protection Relay Terminal Functions

FIGURE 2–39: SR735/737 Relay Terminal Functions Schematic

2.5.3 RTT to SR735/737 Wiring Diagram



- 1. Ensure that Wet/Dry Input Type switch is set to <u>DRY</u> before applying power to the RTT unit. The SR735/737 Relay accepts only **DRY** contact connections to the RTT.
- 2. Ensure that current and voltage knobs are turned fully counter-clockwise before applying power to the RTT unit.

Table 2-5: SR735/737 with RTT Set to Dry

		RTD3 +	
	-	RTD3 -	
	-	RTD3 C	
		RTD2 +	
RTDs*		RTD2 -	
KTD3		RTD2 C	
		RTD1 +	
		RTD1 -	
		RTD1 C	
		SPARE	

	AUX COMMON	H6		l		
Contact	TRIP COMMON	H5			OUTPUT C	
Outputs**	AUX NO	G6			OUTPUT 2	
	TRIP NO	G5			OUTPUT 1	
					INPUT C	
					INPUT 8	
					INPUT 7	RTT
			-		INPUT 6	
Contact Inputs*					INPUT 5	
mpato					INPUT 4	
					INPUT 3	
					INPUT 2	
					INPUT 1	

CTs	Phase 1 +	G1	 I ₊	
CIS	Phase 1 COM	H1	 I_	
VTs*			V ₊	
VIS			V_	



*The 735/737 Relay doesn't have Voltage Input, Switch Input and RTD Input features.

**Trip and Aux Common terminals (H5 and H6) must be hardwired together.

2.5.4 Interfacing to the RTT through the EnerVista 735/737 Setup Program

The following section demonstrates how to navigate, configure, and monitor the operation of the SR735/737 Relay using the EnerVista 735/737 Setup program.

2.5.4.1 Current

▷ **Setup**: Enter the Phase Current (simulation), then Save.

× ×	Simulated Currents		
Site 1	SETTING	PARAMETER	
735_737 Relay 1	Phase A current (Simulation)	0 % of CT	
Device Definition	Phase B current (Simulation)	0 % of CT	
	Phase C current (Simulation)	0 % of CT	
E View Settings	Ground current (Simulation)	0 % of CT	
Custom Scheme			
Simulated Dials			
Simulated Switches			
Samaded Seweries			

FIGURE 2-40: Current Setup

Metering: View the current values measured by the relay, in realtime.

Constant and	Metered Data		
w Site 1	PARAMETER	VALUE	
- 735_737 Relay 1	Phase A current	% of CT	
Device Definition	Phase B current	% of CT	
	Phase C current	% of CT	
Settings Actual Values	Ground current	% of CT	
View Actuals View Actuals Metered Data Pre-Trip Data Dial Settings	735_737 Relay 1 Actual Values: Vie	w Actuals	

FIGURE 2-41: Current Metering

2.5.4.2 Contact Outputs Testing

The two contact ouputs monitored by the RTT should match the status shown in the EnerVista 735/737 Setup.

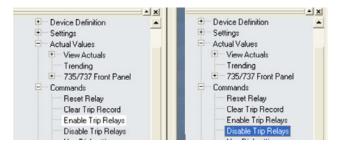


FIGURE 2-42: Contact Outputs Testing





RTT Desktop Test Set

Chapter 3: Using the RTT on UR Series Relays

3.1 Configuration Options

3.1.1 Overview

UR functions vary according to the different order codes.

- Figure 3-2 shows the various types of CT/VT modules related to current and voltage inputs function.
- Figure 3-3 shows the transducer I/O modules related to RTD functions.
- Figure 3-4, 3-5, 3-6, 3-7 show the Digital I/O modules related to contact input and output function.

All features of the RTT can be applied to the UR Series Relay, where applicable. No modification to the Test Cable is required.



Unused Wires

For the unused wires if applicable, it is recommended that the user tape the lugs to ensure isolation of the contacts so that no problems are caused by wires touching.

3.1.2 UR Series Relays Rear Terminal Layout



832768A1.CDR

FIGURE 3-1: UR Series Terminal Layout - General Rear View

3.1.3 UR Series Relays CT/VT Module - Terminal Functions

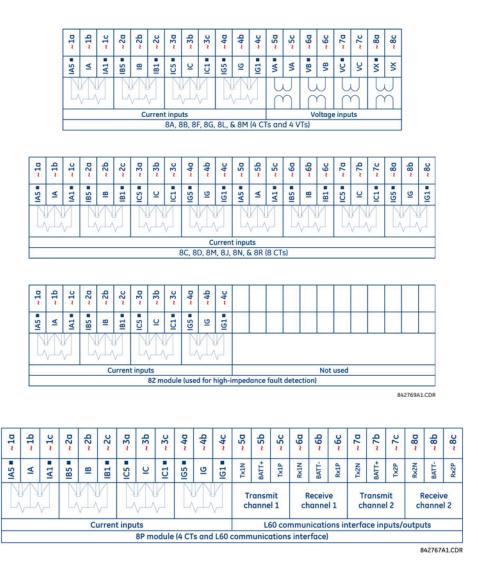


FIGURE 3-2: UR Series - CT/VT Modules - Terminal Functions Schematics

3.1.4 UR Series Relays Transducer and Digital I/O Modules - Terminal Functions

Below are the terminal functions schematics for the UR Transducer Module. The module code shown in the upper right corner of each schematic, indicates the wiring terminal layouts for the various modules you may be using.

^	Ē		~	\[\begin{aligned} \begin{aligned} \tegin{aligned} \tegin{aligned} \tegin{aligned} \tegin{aligned} \tegin{aligned} & tegin{aligned} & tegin{a	~	F			^	-		^	-	<u></u>		^	
-8b		-8c	-8a	∘7c	-7a	-6c	-6a	~5c	-5a	-4c	~4a	-3c	-3a	∘2c	-2a	√1c	~1a
-	_	_	+	-	+	_	+	-	+	-	+	-	+	-	+	-	+
SURGE		dcmA Out		ucina Out	dcmA Out		dcmA Out	demix out	dcmA Out		dcmA in	domA in	dcmA In	dema m	dcmA in	dema m	dcmA In
		~8	-	/	7		~6	~5			~4	~3	. 7	2	~2	~1	
¥	NALOG	18		ৎ	1	4			1		1		1		1	"	δA

 		_				_
~1a ~1c	Hot Comp		RTD		~1	5C
~1b	Return	for	RTD	~1&	~2	
~2a	Hot		RTD		~2	
~2c	Comp		RID		~2	
~3a	Hot		RTD		~3	
~3c	Comp				Ŭ	
~3b	Return	for	RTD	~3&	~4	
~4a	Hot		RTD		~4	
~4c	Comp		NID			
~5a	Hot		RTD		~5	
~5c	Comp				-	
~5b	Return	for	RTD	~5&	~6	
~6a	Hot		RTD		~6	
~6c	Comp		KID		100	
~7a	Hot		RTD		~7	
~7c	Comp				· ·	
~7b	Return	for	RTD	~7&	~8	2
~8a	Hot		RTD		~8	-
~8c	Comp		KID		140	TOG
				_		I≸.
~8b	+		SU	RGE		N

~1a	+	dcmA	le.	~1	Я
~1c	-	dema	in	~1	ľ
~2a	+	dcmA	1	~2	1
~2c	-	acma	in	~2	
~3a	+				-
	- T	dcmA	In	~3	
~3c ~4a	+				-
~4u ~4c	Ŧ	dcmA	In	~4	
~40	_				-
~5a	Hot	RTD		~5	1
~5c	Comp	RID		~5	
~5b	Return	for RTD	~5&	:~6	1
~6a	Hot	RTD		~6	1
~6c	Comp	RID		~0	
~7a	Hot				-
~7c	Comp	RTD		~7	
~7b	Return	fee BTD	~7&	0	0
		IOF RID	~/8	~0	12
~8a	Hot	RTD		~8	8
~8c	Comp				ANALOG
~8b	Ŧ	SU	RGE		1¥

~1a	+	dcmA in	1	۶F
~1c	-	dema in	~1	Ľ
~2a	+	dcmA In	~2	
~2c	-	denix in	,••2	
~3a	+	dcmA In	~3	
~3c	-	denna in		
~4a	+	dcmA in	~4	
$\sim 4c$	-	dema in		
~5a	+	dcmA In	~5	
~5c	-	denna in		
~6a	+	domA In	~6	
~6c	-	dema in	~0	
				4
~7a	+	dcmA In	~7	
~7c	-	denix in	,	2
~8a	+	dcmA in	~8	_
~8c	-	dema in	~0	ANALOG I
				1Z I
~8b	+	SURGE		¥

842764A1.CDR

FIGURE 3-3: UR Series - Transducer I/O Modules - Terminal Functions Schematics



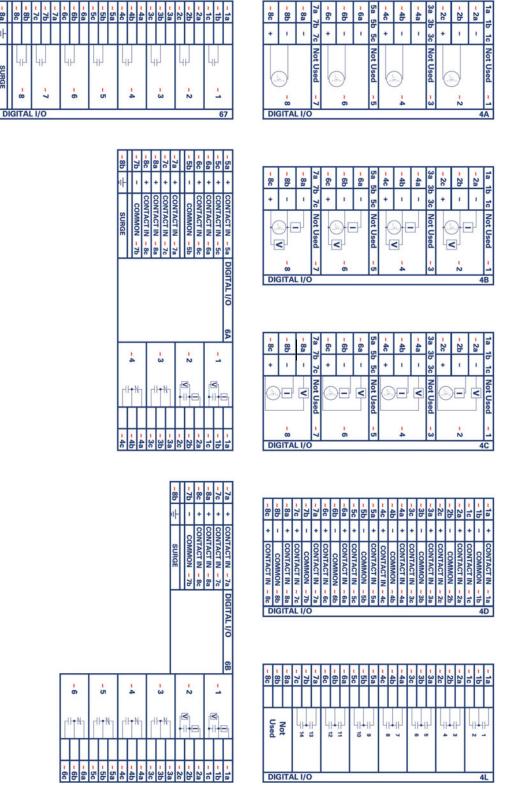


FIGURE 3-4: UR Series - Digital I/O Modules - Terminal Functions Schematics - 1 of 4

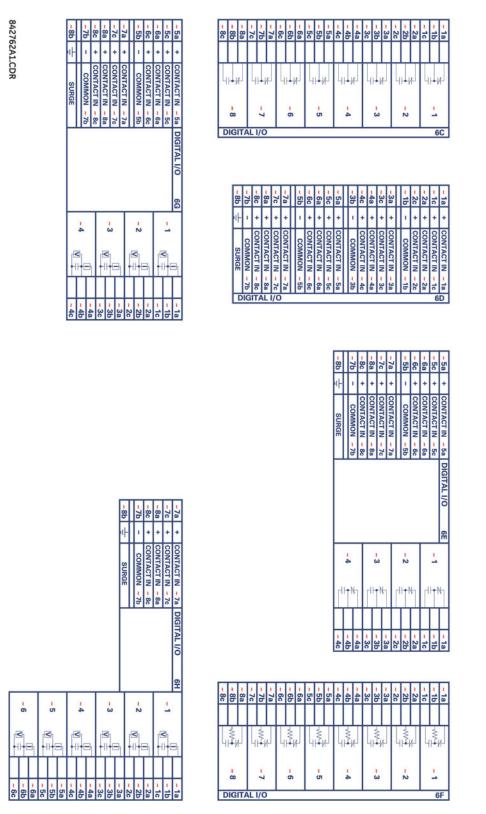


FIGURE 3-5: UR Series - Digital I/O Modules - Terminal Functions Schematic - 2 of 4

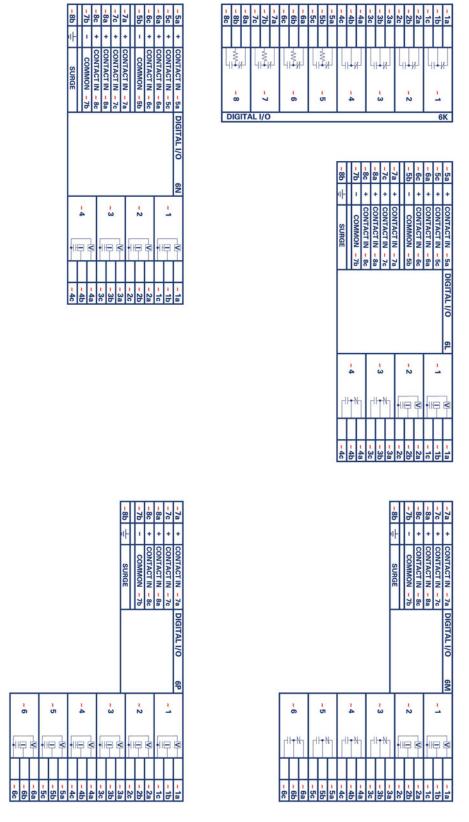
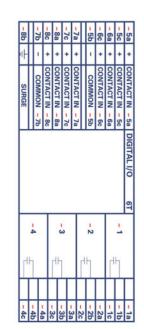


FIGURE 3-6: UR Series - Digital I/O Modules - Terminal Functions Schematics - 3 of 4



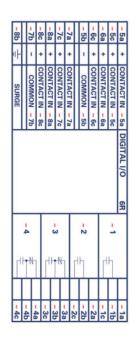




FIGURE 3-7: UR Series - Digital I/O Modules - Terminal Functions Schematics - 4 of 4

3.1.5 RTT to UR Relay Wiring Diagram



 Ensure that Wet/Dry Input Type switch is set to <u>DRY</u> before applying power to the RTT unit.

After connections are made, switch to **WET**

2. Ensure that current and voltage knobs are turned fully counter-clockwise before applying power to the RTT unit.

Table 3–1: UR Series with RTT Set to Wet (Fig 3-3)

	RTD3+	~3a	 RTD3 +	
	RTD3-	~ 3b	 RTD3 -	
	RTD3 COMP	~3c	 RTD3 C	
	RTD2+	~2a	 RTD2 +	
RTDs	RTD2-	~2b	 RTD2 -	
5C/5D	RTD2 COMP	~2c	 RTD2 C	
	RTD1+	~1a	 RTD1 +	
	RTD1-	~1b	 RTD1 -	
	RTD1 COMP	~1c	 RTD1 C	
			SPARE	

	Contact Out 4 Common	~4b]ı		
Contact	Contact Out 3 Common	~3b		OUTPUT C	
Outputs* 6E/6A/6L	Contact Out 4 NO	~4c		OUTPUT 2	
	Contact Out 3 NO	~3c		OUTPUT 1	
	Contact In Common	~7b	_I		
	Contact In Common	~5b		INPUT C	
	Contact In 8	~8c		INPUT 8	RTT
	Contact In 7	~8a		INPUT 7	
Contact	Contact In 6	~7c		INPUT 6	
Inputs** 6E/6A/6L	Contact In 5	~7a		INPUT 5	
	Contact In 4	~6c		INPUT 4	
	Contact In 3	~6a		INPUT 3	
	Contact In 2	~5c		INPUT 2	
	Contact In 1	~5a]	INPUT 1	

CTs 8F/8L	1a (1A)	~1b	 l ₊	
8F/8L	1a (COM)	~1c	 I_	
VTs 8F/8L	VA	~5a	 V ₊	
8F/8L	Vn	~5c	 V_	



Wherever a "tilde" (~) symbol appears, substitute the slot position of the module.

*Contact Output Common terminals (~3b and ~4b) must be hardwired together.

**The voltage threshold of Contact Input should be programmed as 17 VDC.

**Contact Input Common terminals (~5b and ~7b) must be hardwired together.

3.1.6 Interfacing to the RTT through the EnerVista UR Setup Program

The following information describes how to configure the UR relays and how to monitor voltage and current inputs using the UR Setup Software and the RTT.

3.1.6.1 Current

Setup 1: Enter the CT Primary ratio, and Phase CT secondary, then Save.

Window	* X	🗎 Save 🗑 Restore 😭	Default 2 Reset VIEW ALL
Device Definition	-	PARAMETER	CT F1
Settings Product Setup		Phase CT Primary	1.A
	Phase CT	Phase CT Secondary	1 A
- System Setup		Ground CT Primary	1.4
AC Inputs Current		Ground CT Secondary	1.6

FIGURE 3-8: Current Setup 1

> Setup 2: Select the Phase CT group to which current is being applied.

Online Window .	× Save Bestore	Default 2 Reset VIEW	ALL
New Site 1	PARAMETER	SOURCE 1	SOURCE 2
Device Definition Settings Device Setup	Marrie	SRC 1	one a
	Phase CT	None	None
	Ground CT	NUL	None
	Phase VT	None	None
	Aux VT	None	None
System Setup AC Inputs Power System	Aux VT	None	None
Signal Sources	New Device 1 Settings: System Se	tup	

FIGURE 3-9: Current Setup 2

▷ **Metering**: View the current values measured by the relay, in realtime.

PARAMETER Name PHASORS RMS Ia	SOURCE 1 SRC 1 View	
PHASORS	View	
DMC In		
IN CINT	A	
RMS lb	A	
RMS Ic	A	
RMS In	A	
Phasor la	A deg	
Phasor Ib	A deg	
Phasor Ic	A deg	
	RMS In Phasor Ia Phasor Ib	FINS In A Phasor Ia A Phasor Ib A

FIGURE 3–10: Current Metering

3.1.6.2 Voltage

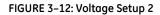
▷ **Setup 1**: Enter the Phase VT Ratio, then Save.

e Window	* X	😫 Save 🔛 Restore 🔛 🛛	Default Reset VIEW ALL mode
Device Definition	-	PARAMETER	VT F5
- Settings		Phase VT Connection	Wye
Product Setup		Phase VT Secondary	66.4 V
- System Setup		Phase VT Ratio	1.00:1
AC Inputs		Auxiliary VT Connection	Vag
Current		Auxiliary VT Secondary	66.4 V
Voltage		Auxiliary VT Ratio	1.00:1

FIGURE 3-11: Voltage Setup 1

> Setup 2: Select the Phase VT group to which current is being applied.

line Window	• x 24 Save	B Restore	Default 2 Reset VIEW	/ ALL mode
New Site 1	-	PARAMETER	SOURCE 1	SOURCE 2
- New Device 1	Name		SRC 1	SRC 2
Device Definition Settings Product Setup	Phase CT		None	None
	Ground CT		None	None
	Phase VT		None	None
E System Setup	AULAT		None	None
AC Inputs Power System Signal Sources Transformer	n -	1 Settings: System Set	up	



Metering: View the voltage values measured by the relay, in realtime.

ndow 🔺 🗙		Default 2 Reset VIEW ALL
Actual Values	PARAMETER	SOURCE 1
Front Panel	Name	SRC 1
Status	PHASORS	View
— Metering	RMS Vag	V
Transformer	RMS Vbg	V
E Source	RMS Vcg	V
- Phase Current	Phasor Vag	V deg
- Ground Current	Phasor Vbg	V deg
Phase Voltage	Phasor Vcg	V deg
- Auxiliary Voltage	RMS ∀ab	V
- Power	RMS Vbc	V
Energy -	RMS Vca	V

FIGURE 3-13: Voltage Metering

3.1.6.3 RTDs

- ▷ Setup 1: Enable each RTD input function.
- Setup 2: For each RTD input, configure the type of RTD that will be connected to the relay.

	× Save Bestore	Default 2 Reset	W ALL mode
 Settings 	▲ SETTING	PARAMETER	
Product Setup	[M1] RTD Input 1 Function	Disabled	
System Setup	[M1] RTD Input 1 ID	RTD lp 1	
FlexLogic	[M1] RTD input 1 Type	100 Ohm Platinum	
Grouped Elements			
Control Elements	[M2] RTD Input 2 Function	Disabled	
 Inputs/Outputs 	[M2] RTD Input 2 ID	RTD to 2	
 Transducer I/0 RTD Inputs 	[M2] RTD Input 2 Type	100 Ohm Platinum	
	[M3] RTD Input 3 Function	Disabled	-
Protection Summary	[M3] RTD Input 3 ID	RTD lp 3	
Commands	[M3] RTD Input 3 Type	100 Ohm Platinum	
Liser Displaus			

FIGURE 3-14: RTD Setup

Metering: Monitor the RTD temperature measured by the relay, in real-time.



10 Ohm RTD input cannot be read using the range of RTD input applied by the RTT.

ine Window 🔹 🗙	발 Save 알 Restore 말	Default Preset VIEV	N ALL mode
Actual Values	RTD INPUT	STATUS	
Front Panel	RTD lp 1 (M1)	*C	
Status	RTD lp 2 (M2)	°C	
Metering	RTD lp 3 (M3)	°C	
Transformer	RTD lp 4 (M4)	*C	
Source	RTD lp 5 (M5)	*C	
- Tracking Frequency	RTD lp 6 (M6)	*C	
- FlexElements	RTD lp 7 (M7)	*C	
Volts Per Hertz	RTD lp 8 (M8)	*C	
RGF Currents			
Transducer I/0			
Transducer IO - RTD I	New Device 1 Actual Values: Transdu	icer I/O	

FIGURE 3–15: RTD Metering

3.1.6.4 Contacts Inputs Status

 If using the "Wet" type of contact input applied by the RTT, select 17 VDC as the threshold voltage. Ensure the Input Type on the RTT is set to match this.



FIGURE 3-16: Threshold Setup

▷ Use the following screen to monitor the status of the contact inputs as you manipulate the Contact Input Switch on the RTT.

Window • x	월 Save 월 Restore 월 L	Default 22 Reset VIEW	/ALL mode
Actual Values Front Panel	CONTACT INPUT	NAME	STATUS
	H5a	Cont lp 1	Off
- Status	HSc	Cont lp 2	Off
Contact Inputs	H6a	Cont lp 3	Off
	H6c	Cont lp 4	Off
- Remote Inputs	H7a	Cont lp 5	Off
Contact Outputs	H7c	Cont lp 6	Off
Virtual Outputs -	HSa	Cont lp 7	Off
Remote Devices Statu Remote Devices Statis	H8c	Cont lp 8	011

FIGURE 3–17: Status

▷ Use the following screen to monitor the status of the Contact Inputs as you manipulate the Contact Input switches on the RTT.

3.1.6.5 Contact Outputs Testing

The two contact outputs monitored by the RTT should match the status shown in the EnerVista UR Setup.

ndow 🔺	x Save Bestore	Default Reset VIEW ALL
 Settings 	▲ SETTING	PARAMETER
Product Setup	Test Mode Function	Disabled
System Setup	Test Mode Initiate	ON
. FlexLogic	Cont Op 1 (H1)	Disabled
 Grouped Elements 	Cont Op 2 (H2)	Disabled
Control Elements	Cont Op 3 (H3)	Disabled
Inputs/Outputs	Cont Op 4 (H4)	Disabled
Transducer I/0 Testing Force Contact Inputs Force Contact Outputs	New Device 1 Settings: Testing	





RTT Desktop Test Set

Chapter 4: Motor Management & Metering

4.1 The 369 Motor Management Relay

4.1.1 Overview

The 369 Relay has 3-phase current inputs and 3-phase voltage inputs with greater than 200 KOhm VT burden. There are also 5 programmable digital inputs other than ACCESS switch input designed for Dry contact connection only and 4 Form-C output relays. The 369 Relay monitors up to 12 RTD inputs, each RTD being field programmable as a 3-wire type of 100 Platinum, 100 Nickel and 120 Nickel.

All features of the RTT can be applied to the 369 Relay. However (a) there are 2 unused input terminal wires, and (b) a modification is required to the cable to fit the 369 terminals.

Modification of the Product Cable

For the wires related to contact inputs and RTDs (16 in total), cut the lugs off the wire and strip the wires to make them fit the 369 terminals.

The lugs to be cut are: R1+, R1-, R1C, R2+, R2-, R2C, R3+, R3-, R3C, DIC, DI6, DI5, DI4, DI3, DI2 and DI1.



Unused Wires

For the unused wires (2 in total), it is recommended that user tape the lugs to ensure isolation of the contacts so that no problems are caused by wires touching.

The unused wires are: DI8 and DI7.

4.1.2 369 Motor Management Relay Terminal Layout

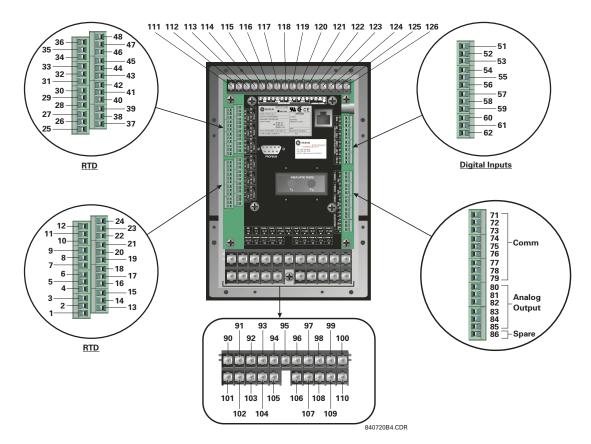


FIGURE 4-1: 369 Motor Management Relay Terminal Layout

4.1.3 RTT to 369 Relay Wiring Diagram



- Ensure that Wet/Dry Input Type switch is set to <u>DRY</u> before applying power to the RTT unit. The 369 Relay accepts only DRY contact connections to the RTT.
- 2. Ensure that current and voltage knobs are turned fully counter-clockwise before applying power to the RTT unit.

Table 4–1: 36	9 Relay with	RTT Set to Dry
---------------	--------------	----------------

	RTD3+	9	 RTD3 +	
	RTD3-	10	 RTD3 -	
	RTD3 COM	11	 RTD3 C	
	RTD2+	5	 RTD2 +	
	RTD2-	6	 RTD2 -	
RTDs	RTD2 COM	7	 RTD2 C	
	RTD1+	1	 RTD1 +	
	RTD1-	2	 RTD1 -	
	RTD1 COM	3	 RTD1 C	
			SPARE	

	ALARM COMMON	115			
Contact	TRIP COMMON	112		OUTPUT C	
Outputs*	ALARM NO	116		OUTPUT 2	
	TRIP NO	113		OUTPUT 1	
	Spare Input Common	52		INPUT C	
				INPUT 8	
				INPUT 7	RTT
Contact	External Reset	61		INPUT 6	
(Digital)	Emergency Restart	59		INPUT 5	
Inputs	Access	57		INPUT 4	
	Speed Switch	55		INPUT 3	
	Differential Input	53		INPUT 2	
	Spare Input	51		INPUT 1	

CTs	la (1A)	93	 I ₊
CIS	la COM	94	 I_
VTs	VA	105	 V ₊
VIS	Vn	106	 V_



*Trip and Alarm Common terminals (112 and 115) must be hardwired together.

4.1.4 Interfacing to the RTT through the EnverVista 369 Setup Program

The following section demonstrates how to navigate, configure, and monitor the operation of the 369 Relay using the EnerVista 369 Setup program.

4.1.4.1 Current

▷ **Setup**: Enter the Phase CT Primary, then Save.

	Current Transformer		
××.	SETTING	PARAMETER	
New Site 1	Phase CT Primary	500 A	Sav.
- 369 Relay 1	Motor Full Load Amps	10 A	
Device Definition	Ground CT Type	5 A Secondary	Bosto
Settings	Ground CT Primary	100 A	1
E S1 Setup			🔛 Defa
S2 System Setup			
E CT/VT Setup			
Current Transformer			
Power System			
Monitoring Setup	Property and the second second	and the second second	
Output Relay Setup	369 Relay 1 Settings: S2 Sy	stem Setup: CT/VT Setup	

FIGURE 4-2: Current Setup

▷ **Metering**: View the current values measured by the relay, in realtime.

	Currents		
- x	SETTING	PARAMETER	
New Site 1	la	A	
🖻 — 369 Relay 1	b	A	
Device Definition	lc	A	
Settings	Average Phase Current	A	
Actual Values	Motor Load	xFLA	
A1 Motor Status	Current Unbalance	%	
A2 Metering Data Currents Phasor	Ground Current	A	
A3 Learned Data			

FIGURE 4-3: Current Metering

4.1.4.2 Voltage

Setup: Configure the VT Connection Type, enter the VT Ratio, then Save.

Device Setup 😰 Quick Conn	ect	📱 Current Transformer	// New S	ite 1: 369 R	alay 1: Setti	ings: S2 S
		Voltage Sensing				
	- ×	SETTING		PARAMET	ER	
New Site 1		VoltageTransformer Connect	ion Type	Wye		
E 369 Relay 1		Voltage Transformer Ratio		35.00:1		
Device Definition		Motor Nameplate Voltage		4000 ∨		
Settings S1 Setup S2 System Setup OCT/VT Setup						

FIGURE 4-4: Voltage Setup

Metering: View the voltage values measured by the relay, in realtime.

	Va	okage		
	-1×	SETTING	PARAMETER	
New Site 1	▲ Va	b	V	
369 Relay 1	Vb	0	V	
Device Definition	Vo	a	V	
Settings	Av	erage Line Voltage	V	
- Actual Values	Va	n	V	
A1 Motor Status	Vb	n	V	
- A2 Metering Data	Vo	n	V	



4.1.4.3 RTDs

▷ **Setup**: Configure the RTD type and the Application for each RTD.

	RTD Types		
	× SETTING	PARAMETER	
ew Site 1	 Stator RTD Type 	100 Ohm Platinum	
369 Relay 1	Bearing RTD Type	100 Ohm Platinum	
+ Device Definition	Ambient RTD Type	100 Ohm Platinum	
Settings	Other RTD Type	100 Ohm Platinum	

FIGURE 4-6: RTD Setup

Metering: Monitor the RTD temperature measured by the relay, in real-time.

	RTD			
<u>_</u>	X RTD Ho.	Temperature	Application	Hame
369 Relay 1	 RTD #1 Temperature 	No RTD	None	
Device Definition	RTD #2 Temperature	°C	Stator	
 Settings 	RTD #3 Temperature	°C	Stator	
Actual Values	RTD #4 Temperature	No RTD	None	
A1 Motor Status	RTD #5 Temperature	°C	Stator	
- A2 Metering Data	RTD #6 Temperature	°C	Stator	

FIGURE 4-7: RTD Metering

4.1.4.4 Contact Inputs Status

▷ Use the following screen to monitor the status of the contact inputs as you manipulate the Contact Input Switch on the RTT.

	Local DI Status		
<u>. x</u>	SETTING	PARAMETER	
369 Relay 1	Access	Open	
Device Definition	Speed	Open	
Settings	Spare	Open	
- Actual Values	Differential Relay	Open	
A1 Motor Status	Emergency Restart	Open	
Motor	Reset	Open	
Last Trip Alarm Status			
Start Inhibit			
Local DI Status			
Local Relay Outputs			
Beal Time Clock	369 Relay 1 Actual Val	use: Al Mokor Statue	

FIGURE 4-8: Contact Inputs Status

4.1.4.5 Contact Outputs Testing

The two contact outputs monitored by the RTT shold match the status shown in the EnerVista 369 Setup.

	Local Relays		
1×	SETTING	PARAMETER	
Device Definition	Force Trip Relay	Disabled	
Settings	Force Trip Relay Duration	0 s	
S1 Setup	Force AUX1 Relay	Disabled	
S2 System Setup	Force AUX1 Relay Duration	0 s	
S3 Overload Protection	Force AUX2 Relay	Disabled	
S4 Current Elements	Force AUX2 Relay Duration	0.5	
S5 Motor Start/Inhibits	Force Alarm Relay	Disabled	
S9 Digital Inputs	Force Alarm Relay Duration	0 \$	
S10 Analog Outputs	0 s means Static		
S11 Testing			
Local Relays	Current Status		
Local A/0	Trip	De-Energized	
User Map	Alarm	De-Energized	
ctual Values	Aux1	De-Energized	
ommands	Aux2	De-Energized	

FIGURE 4-9: Contact Outputs Testing

4.2 The 239 Motor Management Relay

4.2.1 Overview

The 239 Relay has 3-phase current inputs but no voltage inputs feature. The 239 Relay provides 2 programmable and 3 dedicated switch inputs designed for Dry contact connection only, and 4 Form-C output relays. The 239 Relay monitors up to 3 RTD inputs, each RTD being field programmable as a 3-wire type of 100 Platinum, 100 Nickel and 120 Nickel.

All features of RTT, other than VT, can be applied to the 239 Relay. However there are 5 unused input terminal wires, and a modification is required to the cable to fit the 239 terminals.

Modification of the Product Cable

For the wires related to contact inputs/outputs and RTDs (18 in total), cut the lugs off the wire, and strip the wires to make them fit the 239 terminals.

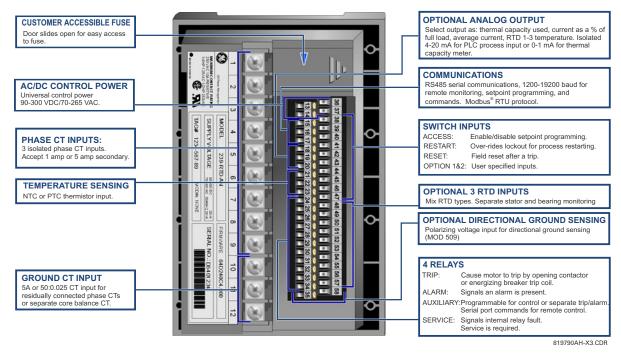
The lugs to be cut are: R1+, R1-, R1C, R2+, R2-, R2C, R3+, R3-, R3C, DOC, DO2, DO1, DIC, DI5, DI4, DI3, DI2 and DI1.



Unused Wires

For the unused wires (5 in total), it is recommended that user tape the lugs to ensure isolation of the contacts so that no problems are caused by wires touching.

The unused wires are: DI8, DI7, DI6, V+, and V-.



4.2.2 239 Motor Management Relay Terminal Layout

FIGURE 4-10: SR239 Relay - Rear View - Terminal Layout

4.2.3 239 Motor Management Relay Terminal Functions

	_	_	_	_	_	_	_	_			_	_	_		_	_
13	14	36	37		1	2	3	4	5	6	7	8	9	10	11	12
SAFETY GROUND	FILTER GROUND	4	N_		5A	1A	COM	5A	1A	COM		1A	COM		50.0.025	
				PHASE A PHASE B F						PHASE C GROUND						
	POW	ER					CURRENT INPUTS									
23	NO	1				٦	Ste.									
24	сом	H	RELAY #		#1	DL Forver management										
25	NC	1	∦ TRIP			239 MOTOR PROTECTION RELAY										
26	NO	-1	1.0		0	D						F		RS4		15
27	сом	H.	RELAY #		#2 0	T						SERIAL		RS4	16	
28	NC	7	1	ALARM		OLITPLIT RELAVS						s l	485 0	GROU	UND	17
29	NO	-				P								1		10
30	сом	-T		LAY #	#3 j						2	SE	0-1mA		} +	18
31	NC	Ŧ	AU			ñ					OU IVIN	10	9			19
32	NO	-									<		SHIELD 20			
33	сом	I	RELAY #								Г		IN+	21		
34	NC	17	0	SERVICE							Т	THERMISTOR-			СОМ	_
						_						_			0.0111	**
43	IN	SETPOINT		S1									SHI	ELD	48	
38	СОМ	A	ACCESS		1						SN SN		- 5	-	нот	49
44	IN	EMERGENCY RESTART		S2	WS					VICI	DTD #	5 2	C	OMP	50	
39	сом			02	TIN					5		EL	-	RET	51	
45	IN	EXTERNAL		S 3	R					a		N E		нот	52	
40	сом	RESET			00	CH INP					TAG		5 2	C	OMP	53
46	IN	OPTION 1			S4	STDe					PTO TEMPERATI DE SENSING		EL	-	RET	54
41	сом				-	S					TEA		0 5	-	нот	55
	IN	OPTION 2			S5						E	DTD #2	5 2	-0	OMP	56
42	COM				00						^a		EL		RET	57
											_					

FIGURE 4-11: SR239 Relay - Terminal Functions Schematic

4.2.4 RTT to 239 Relay Wiring Diagram



- 1. Ensure that Wet/Dry Input Type switch is set to <u>DRY</u> before applying power to the RTT unit. The 239 Relay accepts only **DRY** contact connections to the RTT.
- 2. Ensure that current and voltage knobs are turned fully counter-clockwise before applying power to the RTT unit.

Table 4–2: 239 Relay with RTT Set to Dry	
--	--

	RTD3+	55	 RTD3 +	
	RTD3-	57	 RTD3 -	
	RTD3 COM	56	 RTD3 C	
	RTD2+	52	 RTD2 +	
RTDs	RTD2-	54	 RTD2 -	
KID3	RTD2 COM	53	 RTD2 C	
	RTD1+	49	 RTD1 +	
	RTD1-	51	 RTD1 -	
	RTD1 COM	50	 RTD1 C	
			SPARE	

	ALARM COMMON	27			
Contact	TRIP COMMON	24		OUTPUT C	
Outputs*	ALARM NO	26		OUTPUT 2	
	TRIP NO	23		OUTPUT 1	
	Switch Common	38		INPUT C	
				INPUT 8	
				INPUT 7	RTT
Contact				INPUT 6	
(Digital)	Option 2	47		INPUT 5	
Inputs	Option 1	46		INPUT 4	
	External Reset	45		INPUT 3	
	Emergency Restart	44		INPUT 2	
	Setpoint Access	43		INPUT 1	

CTs	la (1A)	2	 I ₊	
CIS	la COM	3	 I_	
VTs**			V ₊	
VIS			V_	



*Trip and Alarm Common terminals (24 and 27) must be hardwired together.

**The 239 Relay doesn't have Voltage Input function.

4.2.5 Interfacing to the RTT through the EnverVista 239 Setup Program

The following section demonstrates how to navigate, configure, and monitor the operation of the 239 Relay using the EnerVista 239 Setup program.

4.2.5.1 Current

▷ Setup: Enter the Phase CT Primary, then Save.

Device Setup	CT Inputs // Nev	v Site 1: 239 Rela	ay 1: Settings: System Set
<u>**</u>	SETTING	PARAMETER	
New Site 1	Phase CT Primary	OFF	
E- 239 Relay 1	Ground Sensing	Off	
Device Definition Settings Setpoint Access 233 Setup System Setup CT Inputs More Date	Nominal Frequency	60 Hz	

FIGURE 4-12: Current Setup

▷ **Metering**: View the current values measured by the relay, in realtime.

	Current Metering		
<u>* x</u>	SETTING	PARAMETER	
ew Site 1	Phase A Current	A	
239 Relay 1	Phase B Current	A	
Device Definition	Phase C Current	A	
E Settings	Ground Current	A	
Actual Values	Current Unbalance	%	
Status Metering Data Current Metering Motor Capacity			

FIGURE 4–13: Current Metering

4.2.5.2 RTDs

▷ Setup: Configure the RTD Type and the application, for each RTD.

Device Setup	RTD 1 // New Site 1: 2	39 Relay 1: Settings: Protec	tion: Temperature
239 Relay 1 239 Relay 1 Device Definition Setings Setpoint Access Gass Setup Devicecion Phase Current Ground Current Temperature Temperature	SETTBIG	PARAMETER	

FIGURE 4-14: RTD Setup

Metering: Monitor the RTD temperature measured by the relay, in real-time.

	Temperature	
w Site 1 233 Relay 1 ⊕ Device Definition ⊕ Settings ⊕ Actual Values ⊕ Status ⊕ Metering Data ← Current Metering ← Motor Capacity ← Temperature	SETTING	PARAMETER

FIGURE 4-15: RTD Metering

4.2.5.3 Contact Inputs Status

▷ Use the following screen to monitor the status of the contact inputs as you manipulate the Contact Input Switch on the RTT.

	Switch Inputs		
- X	SETTING	PARAMETER	
New Site 1	Setpoint Access	OPEN	
239 Relay 1	Emergency Restart Input	OPEN	
Device Definition	External Reset Input	OPEN	
Settings	Option 1 Input	OPEN	
Actual Values	Option 2 Input	OPEN	
E Status	Currently Selected Setpoints Group	Main Group	
Trip Data			
Alarms			
Auxiliary			
Switch Inputs			
Deserve while Manager			

FIGURE 4–16: Contact Inputs Status

4.2.5.4 Contact Outputs Testing

The two contact outputs monitored by the RTT should match the status shown in the EnerVista 239 Setup.

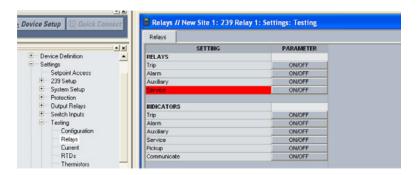


FIGURE 4-17: Contact Outputs Testing

4.3 The 269/269 Plus Motor Management Relay

4.3.1 Overview

The 269/269Plus Relay has 3-phase current inputs but no voltage inputs feature. The Relay provides 6 dedicated switch inputs designed for Dry contact connection only, and 4 output relays. The 269/269Plus Relay monitors up to 10 RTD inputs, each RTD being field programmable as a 3-wire type of 100 Platinum, 100 Nickel and 120 Nickel.

All features of the RTT, other than VT, can be applied to the 269/269Plus Relay. However there are 4 unused input terminal wires, and a modification is required to the cable to fit the 269/269Plus terminals.

Modification of the Product Cable

For the wires related to contact inputs and RTDs (16 in total), cut the wire lugs, and strip the wire to make them fit the 269/269Plus terminals.

The wires to be cut are: R1+, R1-, R1C, R2+, R2-, R2C, R3+, R3-, R3C, DIC, DI6, DI5, DI4, DI3, DI2 and DI1.



Unused Wires

For the unused wires (4 in total), it is recommended that user tape the lugs to ensure isolation of the contacts so that no problems are caused by wires touching.

The unused wires are: DI8, DI7, V+, and V-.

4.3.2 269/269 Plus Motor Management Relay Terminal Layout

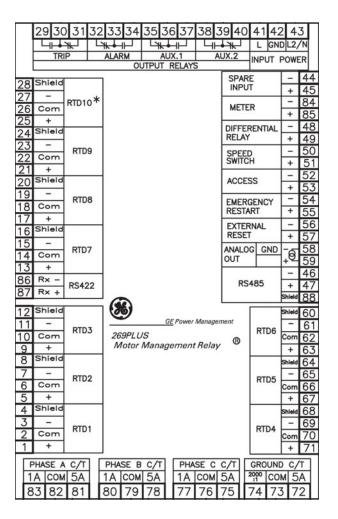


FIGURE 4-18: SR269 Relay Terminal Layoutr

4.3.3 RTT to 269 Wiring Diagram



- 1. Ensure that Wet/Dry Input Type switch is set to <u>DRY</u> before applying power to the RTT unit. The 269/269 Plus Relay accepts only **DRY** contact connections to the RTT.
- 2. Ensure that current and voltage knobs are turned fully counter-clockwise before applying power to the RTT unit.

Table 4–3:	269/269	Plus Relay	with RT	T Set to Dry
------------	---------	-------------------	---------	--------------

	RTD3+	9	 RTD3 +
	RTD3-	11	 RTD3 -
	RTD3 COM	10	 RTD3 C
	RTD2+	5	 RTD2 +
RTDs	RTD2-	7	 RTD2 -
RIDS	RTD2 COM	6	 RTD2 C
	RTD1+	1	 RTD1 +
	RTD1-	3	 RTD1 -
	RTD1 COM	2	 RTD1 C
			SPARE

	ALARM COMMON	33]ı		
Contact	TRIP COMMON	30		OUTPUT C	
Outputs*	ALARM NO	34		OUTPUT 2	
	TRIP NO	29		OUTPUT 1	
	Input Common	44		INPUT C	
				INPUT 8	
				INPUT 7	RTT
Contact	External Reset	57		INPUT 6	
(Digital)	Emergency Restart	55		INPUT 5	
Inputs	Access	53		INPUT 4	
	Speed Switch	51		INPUT 3	
	Differential Input	49		INPUT 2	
	Spare Input	45		INPUT 1	

CTs	Phase A (1A)	83	 I ₊	
CIS	Phase A COM	82	 I_	
VTs**			V ₊	
VIS			V_	



*Trip and Alarm Common terminals (30 and 33) must be hardwired together.

**The 269/269 Plus Relay doesn't have Voltage Input function.

4.3.4 Interfacing to the RTT through the 269PC Program

The following section demonstrates how to navigate, configure, and monitor the operation of the 269/269Plus Relay using the EnerVista 269 Setup program.

4.3.4.1 Current

Setup: Configure the Phase CT Ratio Secondary, enter the Phase CT Ratio, then Store.

	Values Communication V	iew Help		
Setpoints / Motor Ar	mps			×
Undercurrent CT Inputs	Mechanical Jam Motor Specs	Short Circuit Current U/B	Other Ground Fault	ок
Phas	E CT INPUTS IN C.T. Ratio Secondary IN C.T. Ratio	2000:5 100 :x	•	Cancel Store Help Print Screen
	ID CT INPUT	2000:1	•	

FIGURE 4–19: Current Setup

▷ **Metering**: View the current values measured by the relay, in realtime.

ual Values / Phase Current Data		
Phase Current	Timers	
PHASE CURRENT		ок
Phase I1		
Phase I2		
Phase 13		Help
Average		Print Scree
Hottest Stator Term	perature	
Unbalance Ratio (In		

FIGURE 4-20: Current Metering

4.3.4.2 RTDs

▷ **Setup**: Configure the RTD type and the application for each RTD.

GE Power Management - 269PC	
File Setpoints Actual Values Communicati	on View Help
Setpoints / Temperature	×
RTD 6 RTD 7 RTD 8 Config Relays RTD 1	RTD 9 RTD 10 RTD 2 RTD 3 RTD 4 RTD 5 ok
APPLICATION Application Stator	Cancel Store Help
ALARM Alarm Level OFF	COPY SETTINGS
HIGH ALARM High Alarm Level OFF	Сору
TDID	

FIGURE 4-21: RTD Setup

Metering: Monitor the RTD temperature measured by the relay, in real-time.

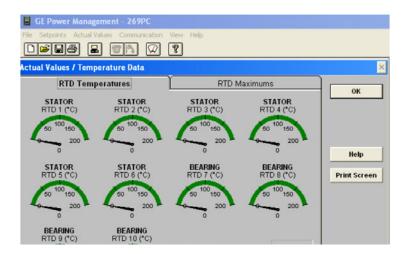
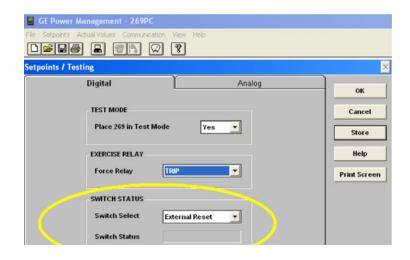


FIGURE 4-22: RTD Metering

4.3.4.3 Contact Inputs Status

▷ Use the following screen to monitor the status of the contact inputs as you manipulate the Contact Input Switch on the RTT.



4.3.4.4 Contact Outputs Testing

The two contact outputs monitored by the RTT should match the status shown in the EnerVista 269/269Plus Setup.

Contraction of the second second	er Management - 269PC s Actual Values Communication View Help	
Setpoints /	Testing	×
	Digital Analog	ок
	TEST MODE Place 269 in Test Mode Yes 💌	Cancel
0	EXERCISE RELAY Force Relay	Help Print Screen
	SWITCH STATUS Switch Select External Reset 💌 Switch Status	

4.4 The PQM and PQMII Power Quality Metering Systems

4.4.1 Overview

The PQM/PQMII has 3-phase current inputs with less than 0.2 VA CT Burden and 3-phase voltage inputs with greater than 2.2 MOhm VT burden. The PQM/PQMII has four programmable switch inputs designed for Dry contact connection only, and 4 Form-C output relays.

All features of RTT, other than RTDs, can be applied to the PQM/PQMII. However there are 13 unused input terminal wires, a modification is required to the cable to fit the PQM/PQMII terminals.

Modification of the Product Cable

For the wires related to contact inputs and contact outputs (8 in total), cut lugs off the and strip the wires to make them fit the PQM/PQMII terminals.

The wires to be cut are: DOC, DO2, DO1, DIC, DI4, DI3, DI2 and DI1.



Unused Wires

For the unused wires (13 in total), it is recommended that user tape the lugs to ensure isolation of the contacts so that no problems are caused by wires touching.

The unused wires are: R1+, R1-, R1C, R2+, R2-, R2C, R3+, R3-, R3C, DI8, DI7, DI6 and DI5.

4.4.2 PQM/PQMII Power Quality Metering Systems Terminal Layout

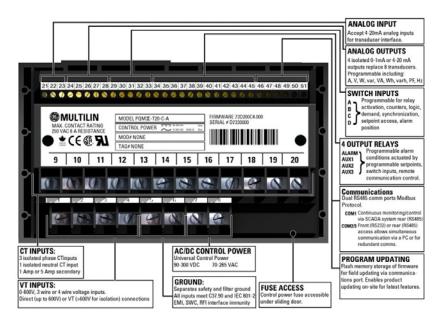


FIGURE 4–23: PQM/PQMII Relay - Rear View - Terminal Layout

4.4.3 PQM/PQMII Power Quality Metering Systems Terminal Functions

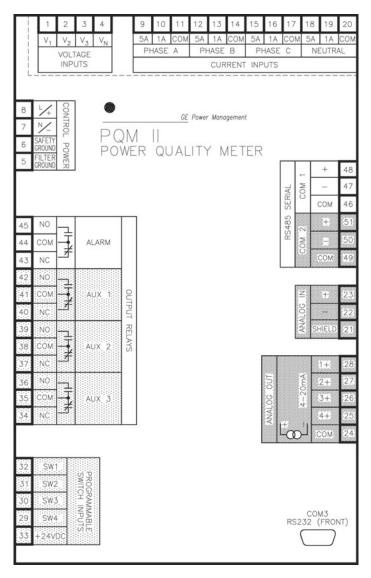


FIGURE 4-24: PQM/PQMII Relay - Terminal Functions Schematic

4.4.4 RTT to PQM/PQMII Relay Wiring Diagram



- 1. Ensure that Wet/Dry Input Type switch is set to **DRY** before applying power to the RTT unit. The PQM/PQMII Relay accepts only dry contact connections to the RTT.
- 2. Ensure that current and voltage knobs are turned fully counter-clockwise before applying power to the RTT unit.

Table 4–4: PQM/PQMII Relay with RTT Set to Dry

		RTD3 +	
		RTD3 -	
		RTD3 C	
		RTD2 +	
RTDs**		RTD2 -	
RIDS		RTD2 C	
		RTD1 +	
		RTD1 -	
		RTD1 C	
		SPARE	

	AUX 1 COMMON	41]I		
Contact	ALARM COMMON	44		OUTPUT C	
Outputs*	AUX 1 NO	42		OUTPUT 2	
	ALARM NO	45		OUTPUT 1	
	Switch Common	33		INPUT C	
				INPUT 8	
				INPUT 7	RTT
Contact				INPUT 6	
(Digital)				INPUT 5	
Inputs	Switch 4	29		INPUT 4	
	Switch 3	30		INPUT 3	
	Switch 2	31]	INPUT 2	
	Switch 1	32		INPUT 1	

CTs	IA (1A)	10	 I+	
CIS	la COM	11	 I_	
VTs	V1	1	 V ₊	
VIS	Vn	4	 V_	



*Alarm and Aux1 Common terminals (44 and 41) must be hardwired together.

**The PQM/PQMII Relay doesn't have RTD function.

4.4.5 Interfacing to the RTT through the EnverVista PQM Setup Program

The following section demonstrates how to navigate, configure, and monitor the operation of the PQM and PQMII Relays using the EnerVista PQM Setup program.

4.4.5.1 Current

▷ **Setup**: Enter the Phase CT Primary, then Save.

	I/V Configuration		
	SETTING	PARAMETER	
	CT Wring	Phase A B and C	
Device Definition	Phase CT Primary	100 A	
Settings	Neutral Current Sensing	OFF	
PQMII Setup	VT Wiring	OFF	
System Setup Analog Dut 1 Analog Dut 2 Analog Dut 3 Analog Dut 3 Analog Dut 4 System Config I// Configuration Analog Input Setu			

FIGURE 4–25: Current Setup

▷ **Metering**: View the current values measured by the relay, in realtime.

	Current	
	SETTING	PARAMETER
- x	Display Select	Actual
QMII Meter 1	Phase A Current	A
Device Definition	Phase B Current	A
Settings	Phase C Current	A
Actual Values	Average Current	A
⊕ Status	Neutral Current	A
Metering	Current Unbalance	%
Current		
Voltage	Clear Min/Max Current Values	Select
Phasors		

FIGURE 4-26: Current Metering

4.4.5.2 Voltage

Setup: Configure the VT Connection Type, enter the VT Ratio, then Save.

- x	I/V Configuration		
System Setup	SETTING	PARAMETER	
Analog Out 1	CT Wring	Phase A B and C	B S
Analog Out 2	Phase CT Primary	100 A	1 and 1
Analog Out 3	Neutral Current Sonoing	OFF	Pa Re
Analog Out 4	VT Wiring	Wire Wye / 3 VTs	
E System Config	VT Ratio	1.0.1	E De
I/V Configuration	VT Nominal Secondary Voltage	120 V	
Analog Input Setu	Nominal Frequency	60 Hz	
Switch Inputs			

FIGURE 4–27: Voltage Setup

Metering: View the voltage values measured by the relay, in realtime.

ice Setup 🕼 Quick Conne	Votage		
- Metering	SETTING	PARAMETER	
Current	Display Select	Actual	Savi
Voltage	Votage Van	V	Server 1
Phasors	Votage Vbn	V	Rosto
Power kW	Votage Vcn	V	
Power kvar	Average Phase Voltage	V	(H) Dofau
Power kVA	Votage Vab	V	100
Power Factor	Votage Vbc	V	
Demand	Votage Vca	V	
Frequency	Average Line Votage	V	
Energy	Votage Unbalance	%	
Pulse Input Analog Input	Clear Min/Max Voltage Values	Select	

FIGURE 4-28: Voltage Metering

4.4.5.3 Contact Inputs Status

▷ Use the following screen to monitor the status of the contact inputs as you manipulate the Contact Input Switch on the RTT.

	Switch Inputs Status		
	SETTING	PARAMETER	
-1×	Switch Input A Status	OPEN	
ctual Values	Switch Input B Status	OPEN	
Status	Switch Input C Status	OPEN	
Alarms	Switch Input D Status	OPEN	
-Aux 1			
- Aux 2			
- Aux 3			
Device Clock			
- Switch Inputs Status			
Switch Inputs Stat			
Switch Inputs Stat			

FIGURE 4–29: Contact Inputs Status

4.4.5.4 Contact Outputs Testing

The two contact outputs monitored by the RTT should match the status shown on the EnerVista PQM Setup.

	Relays				
		INDICATORS		RELAYS	
1×	Alarm	ON/OFF	INACTIVE	ON/OFF	DE-ENERGIZED
Device Definition	Aux 1	ON/OFF	INACTIVE	ON/OFF	DE-ENERGIZED
Settings	Aux 2	ON/OFF	INACTIVE	ON/OFF	DE-ENERGIZED
PQMII Setup	Aux 3	ON/OFF	INACTIVE	ON/OFF	DE-ENERGIZED
System Setup	Alarm Status	ON/OFF	INACTIVE		
Output Relays	Program	ON/OFF	INACTIVE .		
Testing	Simulation	ON/OFF	INACTIVE .		
Relays	Self Test	ON/OFF	INACTIVE		
Current/Voltage -					
Analog Outputs		END TEST	1		
Analog Input Simulation	the second se				

FIGURE 4–30: Contact Outputs Testing



RTT Desktop Test Set



Chapter 5: F650 Feeder/Bay Protection Relay

5.1 The F650 Feeder/Bay Protection Relay

5.1.1 Overview

F650 functions vary with different order codes. Figure 5-1 shows input/output configurations for boards F1 and F2.

All features of RTT, other than RTDs, can be applied to the F650 Relay, where applicable. No modification of the Test Cable is required.



Unused Wires

For the unused wires (9 in total), it is recommended that user tape the lugs to ensure isolation of the contacts so that no problems are caused by wires touching.

The unused wires are: R1+, R1-, R1C, R2+, R2-, R2C, R3+, R3- and R3C.

5.1.2 F650 Feeder/Bay Protection Relay Terminal Layout

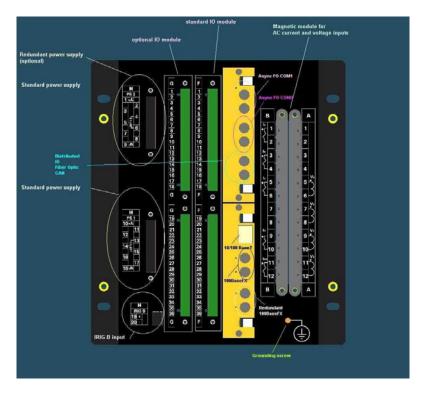


FIGURE 5-1: F650 Feeder/Bay Protection Relay Terminal Layout

5.1.3 RTT to F650 Relay Wiring Diagram



1. Ensure that Wet/Dry Input Type switch is set to <u>WET</u> before applying power to the RTT unit. The F650 Relay accepts only **WET** contact connections to the RTT.

2. Ensure that current and voltage knobs are turned fully counter-clockwise before applying power to the RTT unit.

Table 5–1: F650 Relay with RTT Set to Dry

			RTD3 +	
		-	RTD3 -	
		-	RTD3 C	
		-	RTD2 +	
RTDs**		-	RTD2 -	
RIDS		-	RTD2 C	
		-	RTD1 +	
		-	RTD1 -	
		-	RTD1 C	
			SPARE	

	O2 COMMON	~24]		
Contact	O1 COMMON	~21		OUTPUT C	
Outputs*	02	~22		OUTPUT 2	
	01	~19		OUTPUT 1	
	COMMON 1 - 8	~9		INPUT C	
	CC8	~8		INPUT 8	
	CC7	~7		INPUT 7	RTT
Contact	CC6	~6		INPUT 6	
(Digital)	CC5	~5		INPUT 5	
Inputs	CC4	~4		INPUT 4	
	CC3	~3		INPUT 3	
	CC2	~2]	INPUT 2	
	CC1	~1		INPUT 1	

CTs	la +	B1	 I ₊	
CIS	la COM	B2	 I_	
VTs	VA	A5	 V ₊	
VIS	Vn	A6	 V_	



*O1 and O2 Common terminals (~21 and ~24) must be hardwired together.

**The F650 Relay doesn't have RTD function.

5.1.4 Interfacing to the RTT through the EnerVista F650 Setup Program

The following section demonstrates how to navigate, configure, and monitor the operation of the F650 Relay using the EnerVista F650 Setup program.

5.1.4.1 Current

▷ **Setup**: Enter the Phase CT Ratio, then Save.

	281 1		
stem Setup -> Gene	ral Settings		
General Settings			
deneral securitys			
Name	Value		Cancel
Phase CT Ratio	1.0	[1.0:6000.0]	
Ground CT Ratio	1.0	[1.0:6000.0]	Cancel
Sty Ground of Table		[1.0.0000.0]	Store
Phase VT Ratio	1.0	[1.0:6000.0]	Store
Phase VT Connection	WYE 💌		>>
Nominal Voltage	100.0	V [1.0:250.0]	
Nominal Frequency	50 Hz 👻		
Phase Rotation	ABC		
Frequency Reference	vi -		SPrint scree
Auxiliary Voltage	VX 💌		
Snapshot Events	DISABLED		

FIGURE 5-2: Current Setup

Metering: View the current values measured by the relay, in realtime.

	0121	2	
Current			×
Current			
CT Ratio			
CT Ratio Ig			
CT Ratio Isg			
la Angle		Deg	
lb Angle		Deg	
lc Angle		Deg	
In Angle		Deg	
lg Angle		Deg	
lsg Angle		Deg	
Phasor la Primary		KA	
Phasor Ib Primary		KA	
Phasor Ic Primary		KA	
Phasor Ig Primary		KA	
Phasor Isg Primary		KA	
Phasor In Primary		KA	
RMS la Primary		KA	
RMS Ib Primary		KA	
RMS Ic Primary		KA	
RMS Ig Primary		KA	
RMS lsg Primary		KA	
10 Primary		KA	
11 Primary		KA	
12 Primary	i.	KA	

FIGURE 5–3: Current Metering

5.1.4.2 Voltage

Setup: Configure the VT Connection Type, enter the VT Ratio, then Save.

8990			
stem Setup -> Gene	ral Settings		
General Settings			
Name	Value		 🗸 ок
Phase CT Ratio	1.0		Cancel
Ground CT Patie			× cancer
Sev Ground CT Ratio	1.0		Store
Phase VT Ratio	1.0	[1.0:6000.0]	
Phase VT Connection			>>
Nominal Voltage		V [1.0 : 250.0]	
Nominaria			<<
	ABC	 	Qui
Frequency Reference Auxiliary Voltage		<u> </u>	SPrint screen
	VX VX		

FIGURE 5-4: Voltage Setup

Metering: View the voltage values measured by the relay, in realtime.

e Setpoint	Actual	Opera	stion
6 🗟		1	
Voltage			
Voltage			
PT Ratio			
Va Angle		Deg	
Vb Angle		Deg	
Vc Angle		Deg	
Vn Angle		Deg	
Vx Angle		Deg	
Vab Angle		Deg	
Vbc Angle		Deg	
Vca Angle		Deg	
V0 Primary		KV	
V1 Primary		KV	
V2 Primary		KV	
Vab Primary		KV	
Vic Primary		KV	
Vca Primary		KV	
Va Primary		KV	
Vb Primary		ΚV	
Vc Primary		KV	
Vn Primary		KV	
Vx Primary		ΚV	
VBB Primary		KV	
VL Primary		KV	

FIGURE 5-5: Voltage Metering

5.1.4.3 Contacts Inputs Status

▷ Use the following screen to monitor the status of the contact inputs as you manipulate the Contact Input Switch on the RTT.

e Setpoint Actual Ope	
Board F	
Board F	
CONT IP_F_CC1 (CC1)	
CONT IP_F_CC2 (CC2)	
CONT IP_F_CC3 (CC3)	
CONT IP_F_CC4 (CC4)	
CONT IP_F_CC5 (CC5)	
CONT IP_F_CC6 (CC6)	
CONT IP_F_CC7 (CC7)	
CONT IP_F_CC8 (CC8)	
CONT IP_F_CC9 (CC9)	
CONT IP_F_CC10 (CC10)	
CONT IP_F_CC11 (CC11)	
CONT IP_F_CC12 (CC12)	
CONT IP_F_CC13 (CC13)	
CONT IP_F_CC14 (CC14)	
CONT IP_F_CC15 (CC15)	
CONT IP_F_CC16 (CC16)	
BOARD F STATUS	

5.1.4.4 Contacts Outputs Testing

The two contact outputs monitored by the RTT should match the status shown in the EnerVista F650 Setup.

		8	
Board F			
Board F			
CONT OP OPER_F_0	1		
CONT OP OPER_F_0	2		
CONT OP OPER_F_0	3		
CONT OP OPER_F_0	4		
CONT OP OPER_F_0	5		
CONT OP OPER_F_0	6		
CONT OP OPER_F_0	7		
CONT OP OPER F 0	0		